For the competent person

Installation manual

auroTHERM exclusive

VTK 570/2; VTK 1140/2

GB, IE

Vaillant

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1 Notes on the documentation

1.1 Symbols used

Symbols

The following symbols may appear:

	Warning symbol (→ Page 6)
	Information symbol
▶	Symbol for a required action
◁	Symbol for the result of an action
	Symbol for the completion of records and checklists
	Symbol for a required qualification
	Symbol for a required tool
	Symbol for the specification of a technical value
	Symbol for adjacent array configuration
	Symbol for array configuration on top of each other

1.2 Observing other applicable documents

- ▶ All installation instructions for the component parts and components of the solar plant must be observed when installing the collectors.

These installation instructions are enclosed with the various system parts and supplementary components.

1.3 Document storage

Document handover

- ▶ Pass this installation manual and all other applicable documents and, if necessary, any required tools to the system operator.

Availability of documents

The system operator is responsible for storing the documents so that they are available whenever required.

1.4 Applicability of the instructions

These instructions apply for the following only:

Collector types and article numbers

VTK 570/2	0010002225
VTK 1140/2	0010002226

1.5 Name

In this manual, tube collectors are referred to as collectors.

2 Safety

2.1 Action-related warnings

Classification of action-related warnings

The action-related warnings are classified in accordance with the severity of the possible danger using the following warning signs and signal words:

Warning symbols and signal words

Danger!
Imminent danger to life or risk of severe personal injury

Danger!
Risk of death from electric shock

Warning.
Risk of minor personal injury

Caution.
Risk of material or environmental damage

2.2 Required personnel qualifications

This manual is intended for persons with the following qualifications

2.2.1 Authorised competent person

The installation, assembly and removal, start-up, maintenance, repair and decommissioning of Vaillant products and accessories must only be carried out by authorised competent persons.

Note
Each competent person is qualified for specific activities on the basis of their training. They must only work on units if they have the required qualification.

When working on the units, the competent persons must observe all applicable directives, standards, laws and other regulations.

2.3 General safety information

2.3.1 Danger due to improper use

Vaillant **auroTHERM VTK** tube collectors are constructed using state-of-the-art technology in accordance with the recognised safety rules and regulations. Nevertheless, there is still a risk of injury or death to the user or others or of damage to the unit and other property in the event of improper use or use for which it is not intended.

2.3.2 Risk of death due to improper fastening systems

The collectors may fall due to improper fastening systems.

Only the combination of Vaillllant collectors and Vaillant fastening systems has been tested. This combination can withstand the forces caused by additional wind and snow loads.

- ▶ Only use the collector fastening systems that are approved by Vaillant.

2.3.3 Risk of death due to inadequate load-bearing capacity of the roof

A roof with an insufficient load-bearing capacity may collapse due to the additional load of the collectors.

Above all, additional wind and snow loads may result in higher forces which could cause the roof to collapse.

- ▶ Ensure that a structural engineer has confirmed the roof as suitable for collector installation.
- ▶ Only install the collectors on a roof that has adequate load-bearing capacity.

2.3.4 Risk of death due to falling parts

Unsecured collectors can fall from the roof and present a danger to persons.

- ▶ Block off the areas in the fall area below the place of work to a sufficient extent so that persons cannot be injured by falling objects.
- ▶ Indicate the working area, e.g. with information signs, in accordance with the applicable regulations.

2.3.5 Risk of injury and material damage due to incorrect maintenance and repairs

If maintenance or repair work is not carried out, or is carried out incorrectly, this may result in injuries or in damage to the solar plant.

- ▶ Ensure that only an approved competent person carries out maintenance and repair work.

2.3.6 Risk of death due to inadequate fastening of the collectors

Collectors can fall from their anchors if they are not properly fastened on the roof. Collectors falling from the roof could cause life-threatening accidents.

- ► Perform all work steps as described in this manual.
- ► Observe all safety precautions described in this manual.
- ► In addition, comply with all safety regulations that specifically apply in your region.

2.3.7 Risk of burns due to hot collector surfaces

In the event of solar radiation inside the units, collectors can reach 300 °C. If you touch the collectors without protection, you could burn yourself.

- ► Remove the sun protection film installed at the factory only after the solar plant has been started up.
- ► Avoid performing installation and maintenance work under direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

2.3.8 Risk of injury due to breaking glass

The glass of the collectors may break due to mechanical destruction or torsion.

- ► Wear suitable safety gloves.
- ► Wear suitable protective goggles.

2.3.9 Material damage caused by a high-pressure cleaner

High-pressure cleaners may damage the collectors due to the extremely high pressure.

- ► Never clean the collectors with a high-pressure cleaner.

2.3.10 Material damage due to lightning

Lightning can damage the collector system.

- ► Connect the collector system to a lightning protection device in accordance with applicable regulations.

2.3.11 Frost damage due to water in the solar circuit

Water residue in the collector may freeze in frosty conditions and damage the collector.

- ► Never fill or flush the collector with water.
- ► Only fill and flush the collector with Vaillant ready-mixed solar fluid.
- ► Check the solar fluid regularly with an antifreeze tester.

2.3.12 Material damage due to an unsuitable tool

An unsuitable tool may damage the solar plant.

- ► Only use a suitable tool.
- ► In particular, only use the tool specified in the work steps of this manual.

2.3.13 Risk of death from electric shock

Incorrect installation or a faulty power cable can result in a supply voltage on the pipes, which can cause life-threatening injuries.

- ► Secure earthing pipe clamps to the pipes.
- ► Connect the earthing pipe clamps to a busbar using 16 mm² copper cable.

2.3.14 Material damage due to overvoltage

Overvoltage may damage the solar plant.

- ► Earth the solar circuit to provide equipotential bonding and overvoltage protection.
- ► Secure earthing pipe clamps to the pipes.
- ► Bond the earthing pipe clamps to a busbar using 16 mm² copper cable.

2.3.15 Risk of death and material damage due to contact corrosion

For roofs or façade sections made of metals more precious than aluminium (e.g. copper roof), contact corrosion may occur on the brackets. Collectors could fall and put persons at risk.

- ► Use suitable underlays to separate the metals.

2.3.16 Material damage due to snow falling from roofs

If the collector field is installed below a sloping roof, then snow falling from the roof may damage the collectors.

- ► Install snow fences above the collectors as protection against falling snow.

2.4 Intended use

2.4.1 Intended use

Vaillant **auroTHERM VTK** tube collectors are used for solar heating support and for solar-supported hot water generation.

2.4.2 Suitability of the equipment

The collectors must only be operated with Vaillant ready-mixed solar fluid. Passing heating water or hot water directly through the collectors constitutes improper use.

2.4.3 Improper use

Any use which is not explicitly mentioned in the chapter "Intended use" (→ Page 8) is deemed improper.

Any other or additional use does not comply with the intended use. Any direct commercial or industrial use is also deemed to be improper. The manufacturer/supplier is not liable for any damage resulting from such use. The user alone bears the risk.

2.4.3.1 Combination with other components

Vaillant **auroTHERM VTK** tube collectors must only be combined with components (fastenings, connections, etc.) and system parts that are supplied by Vaillant. The use of other components or system parts shall be considered as improper use.

2.4.3.2 Installation in or on vehicles

Installation of the Vaillant **auroTHERM VTK** tube collector in or on a vehicle is not permissible and is considered improper use. Units that are not classed as vehicles are those that are installed in a fixed and permanent location (known as "fixed installation").

2.4.4 Other applicable documents

Intended use includes the following:

- observance of accompanying operating, installation and servicing instructions for Vaillant products as well as for other parts and components of the system,
- installing and fitting the unit in accordance with the boiler and system approval,
- compliance with all inspection and maintenance conditions listed in the instructions.

2.5 Regulations (directives, laws, standards)

2.5.1 Installation regulations

Regulations

Applies to: Great Britain

Technical Guidance

The system must be installed in accordance with all relevant and applicable national regulations, and must be installed to suit site conditions. Observe all national regulations, including:

- Working at Heights Regulations 2005
- Health and Safety at Work Act 1974
- Electricity at Work Regulations 1989
- IEE Wiring Regulations BS 7671
- Lightning protection requirements
- Equipotential bonding of electrical installations.

Related documents

The installation of the solar system must be in accordance with the relevant requirements of Health and Safety Document No. 635 (The Electricity at Work Regulations 1989), BS7671 (IEE Wiring Regulations) and the Water Supply (Water Fitting) Regulations 1999, or The Water Bylaws 2000 (Scotland). It should also be in accordance with the relevant requirements of the Local Authority, Building Regulations, The Building Regulations (Scotland), The Building Regulations (Northern Ireland) and the relevant recommendations of the following British Standards:

- BS EN 806: Specification for installations inside buildings conveying water for human consumption
- BS 6700: Services supplying water for domestic use within buildings and their curtilages
- BS 5449 Forced circulation hot water central heating systems for domestic premises. Note: only up to 45 kW
- BS. 6880 Low temperature hot water heating systems of output greater than 45 kW
- Part 1 Fundamental and design considerations.
- Part 2 Selection of equipment
- Part 3 Installation, commissioning and maintenance
- BS 6114: Expansion vessels using an internal diaphragm for unvented hot water supply systems
- BS. 4814 Specification for: Expansion vessels using an internal diaphragm, for sealed hot water heating systems
- Unvented hot water systems must comply with building regulation G section 3

2.5.2 Regulations for the prevention of accidents

Applies to: Great Britain

When carrying out works such as solar installation work it is necessary to do so in a safe and workman like manner, taking due care of any aspects of the works that could result in

injuries to person in or about the building as well as workers, passers by and the general public at large. To that end these works must conform, but not be limited to, the current regulations in force such as the following:

- Health and Safety at Work act 1974
- Work at Height Regulations 2005
- Electricity at Work Regulations 1989
- All necessary Building Regulations

Work should be preceded by a risk assessment covering all aspects of health and safety risks, or training requirements that can reasonably be foreseen to be associated with the work. All scaffolding in the UK, other than prefabricated (zip-up) scaffold towers, must be designed and constructed by a vetted contractor, and have suitable kick boards, hand rails and where appropriate netting. Areas around the scaffolding should be zoned off and marked with suitable warning signs to a suitable distance to protect persons from falling objects. Workers should have available and use personal protective equipment as necessary. This would include equipment such as fall protection systems, safety gloves, goggles, dust masks as well as any specialised equipment that may be in use such as lifting and handling equipment.

The completed works shall comply with all necessary BS EN Standards and Codes of practice as well as Building control or planning requirements and be confirmed where necessary by notification to building control or the appropriate competence based notification body.

2.6 CE label

CE The CE label documents that the appliances as described in the type overview satisfy the basic requirements of the following directives:

- Directive 97/23/EC of the European Parliament and Council on the approximation of the laws of the member states regarding pressure equipment

3 Description of the unit

3.1 Type overview

- **VTK 570/2**
- **VTK 1140/2**

3.2 Information on the identification plate

Information on the identification plate	Meaning
	CE label: The collectors comply with the relevant product-specific European guidelines.
	Solar Keymark: The collectors have been successfully tested according to the rules and requirements for the Solar Keymark.
	Read the installation manual.
VTK 570/2 VTK 1140/2	Type designation
VTK	Vaillant tube collector
570, (1140)	Collector output
/2	Unit generation
auroTHERM exclusive	Unit type
Vacuum tube collector	Tube collector
AG	Gross area
VF	Liquid volume
m	Weight
l	Dimensions
Qmax	Max. output
tstgf	Stagnation temperature
Pmax	Max. permissible operating pressure
	Bar code with serial number The 7th to 16th digits of the serial number form the article number

3.3 Purpose of the unit

The collectors are used for solar heating support as well as for solar-supported hot water generation.

4 On-roof fitting and installation

► When fitting and installing the collectors, you must observe the chapter "Safety".

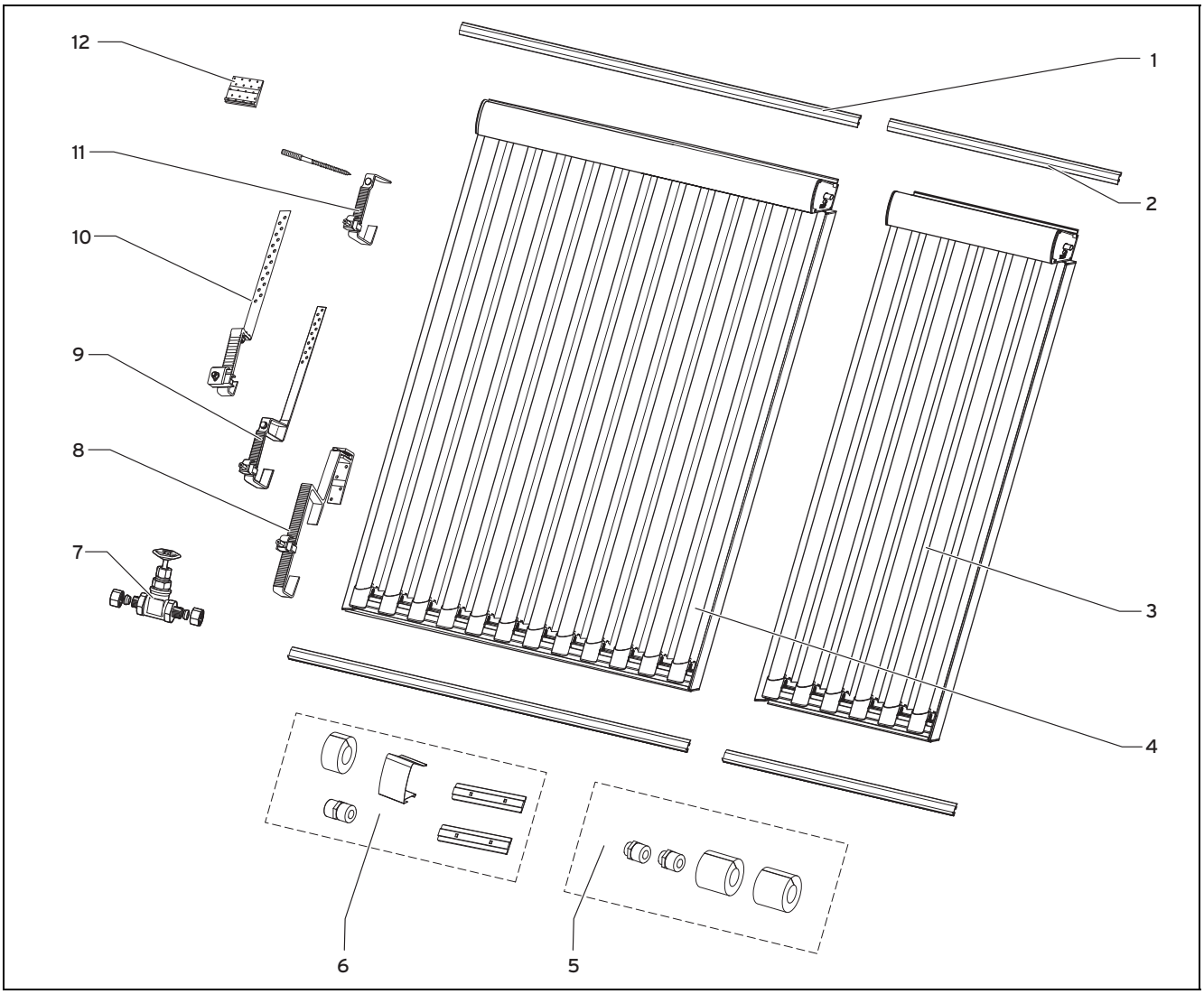
4.1 Preparing for fitting and installation

4.1.1 Delivery, transport and positioning

4.1.1.1 Storing collectors

► To prevent moisture from penetrating into the collector, always store the collectors dry and in a weatherproof area.

4.1.1.2 Checking the scope of delivery



List of materials for on-roof installation

1 VTK 1140/2 rail set
2 pc.

2 VTK 570/2 rail set
2 pc.

3 VTK 570/2 tube collector
1 pc.

4 VTK 1140/2 tube collector
1 pc.

5 VTK installation set (basic set)
1 pc.

6 VTK installation set (extension set)
1 pc.

7 Stop valve, 2-way VTK for parallel connection
1 pc.

8 Roof bracket type P (for pantile) (basic set)
4 pc.
Roof bracket type P (for pantile) (extension set, on top of each other)
2 pc.

9 Roof bracket type S (for beaver tail, etc.) (basic set)
4 pc.
Roof bracket type S (for beaver tail, etc.) (extension set, on top of each other)
2 pc.

10 Roof bracket type S flat (for beaver tail, etc.) (basic set)
4 pc.
Roof bracket type S flat (for beaver tail, etc.) (extension set, on top of each other)
2 pc.

11 Hanger bolt fastening set (basic set)
4 pc.
Hanger bolt fastening set (extension set, on top of each other)
2 pc.

12 Long base, hook type P
4 pc.

► Use the image to check that the installation sets are complete.

4.1.1.3 Transporting collectors

1. To protect the collectors against damage, always transport them when they are standing horizontally.
2. Transport the collectors to the roof using suitable aids.

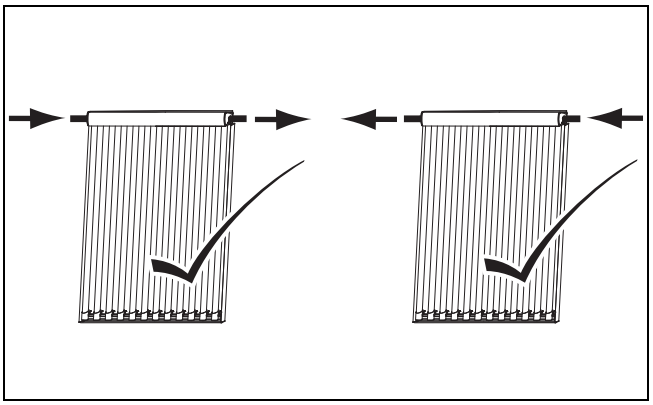
4.1.2 Complying with clearances and installation clearances

In order to fit the collectors correctly, the specified clearances and installation clearances must be observed.

► For the necessary edge clearances, see chapter "Defining edge clearances of the roof brackets".

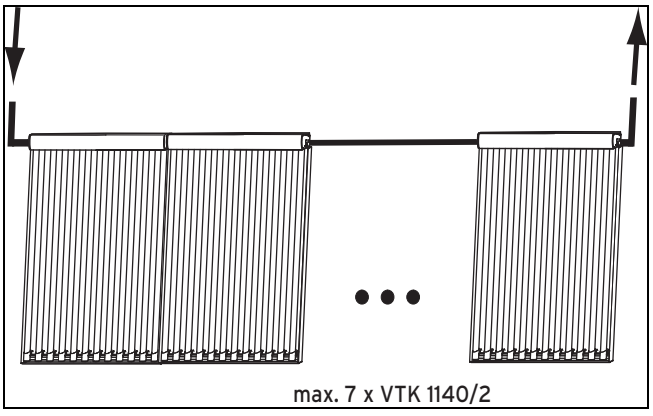
4.1.3 Selecting suitable connection

► Select the appropriate connection for the collectors.



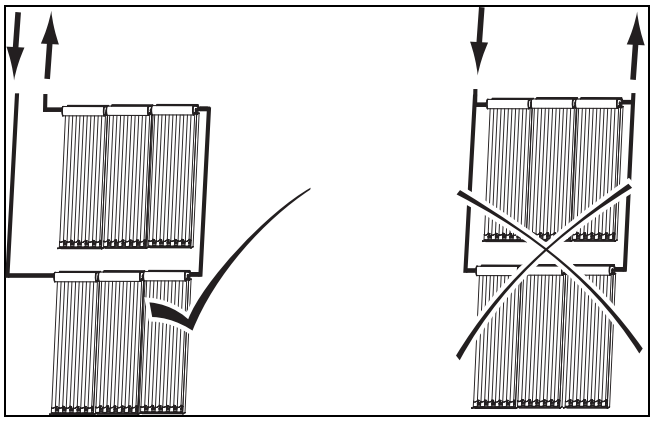
► Ensure that the solar fluid flows through the collectors either from left to right or from right to left.

Conditions: Number of **VTK 1140/2** collectors: 1 ... 7



► Switch up to 7 **VTK 1140/2** units in series (according to the 14 m² aperture surface area).

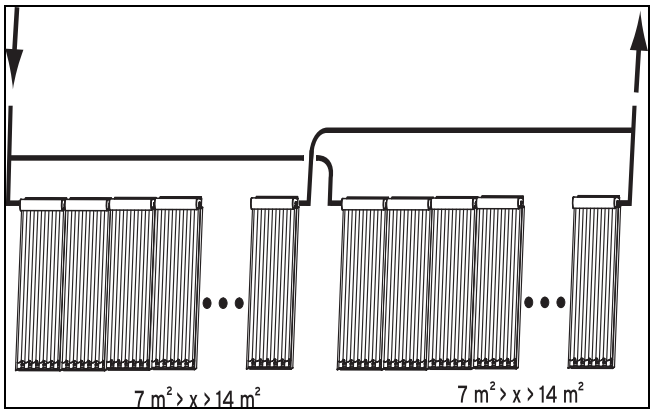
Conditions: Parallel connection, aperture surface area: ≤ 7 m²



► Always connect as many collectors as possible in series, even when several collector rows are arranged on top of each other.

Note
Up to an aperture surface area of 7 m² (accordingly for 3 pcs **VTK 1140/2** + 1 pc **VTK 570/2**), you must switch the collectors in series.

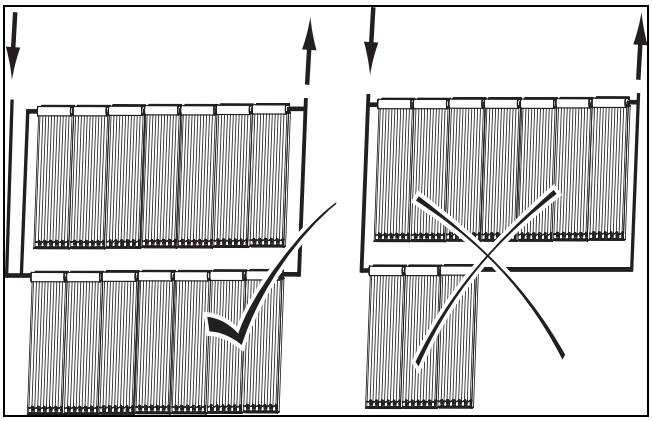
Conditions: Parallel connection, aperture surface area: ≥ 14 m²



► Set up several parallel collector rows and connect these hydraulically in parallel.

► Always connect as many collectors (at least 7 m²) as possible in series.

Conditions: Parallel connection



- ► To avoid pressure losses in the sub-collector fields, only use parallel connection for collector rows with the same number of collectors.
- ► Ensure that each sub-collector field has the same total tube length in the flow and return (Tichelmann system), in order to avoid pressure losses in the connection tubes.

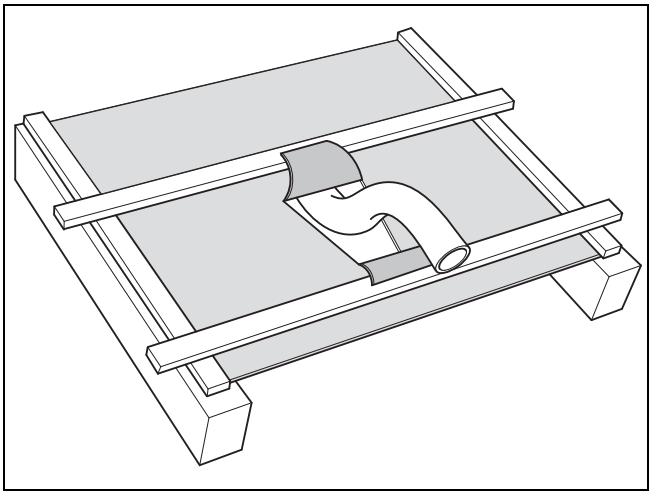
4.1.4 Preparing the roof duct

Caution.

Building damage due to penetrating water.

If the roof duct is not prepared properly, water may penetrate the building interior.

- ► Ensure that the roof duct is prepared properly.

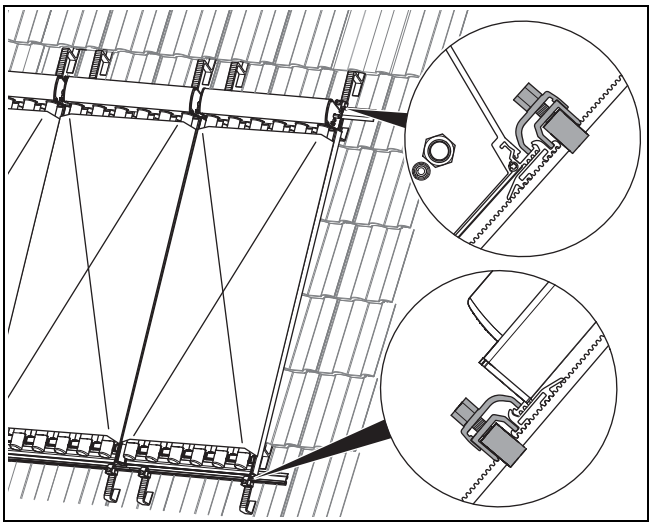


1. Make a v-shaped cut in the roofing felt membrane.
2. Fold the upper, wider flap onto the roof batten above, and fold the lower, narrower flap onto the roof batten below.
3. Fix the roofing felt membrane tight to the roof batten, so that any moisture runs off to the side.

4.1.5 Putting together components

Note
In the case of roof batten clearances greater than 460 mm, the 2-row and 3-row installations are not possible. In this case, you can install the 2 or 3 rows individually (without using the same central roof anchor).

Conditions: Collector rows: 1



► Use the following table to put together the components for installation.

Number of VTK 1140/2 collectors	1	2	3	4	5	6	7
Components	**Required sets**						
VTK installation set (basic set)	1 [1]						
VTK installation set (extension set)	–	1	2	3	4	5	6
Roof bracket set type P (pantile)	1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)							
Roof bracket set type S, flat (slate)							
Roof anchor set, hanger bolt							
Rail set (2 pcs), VTK 1140/2	1	2	3	4	5	6	7

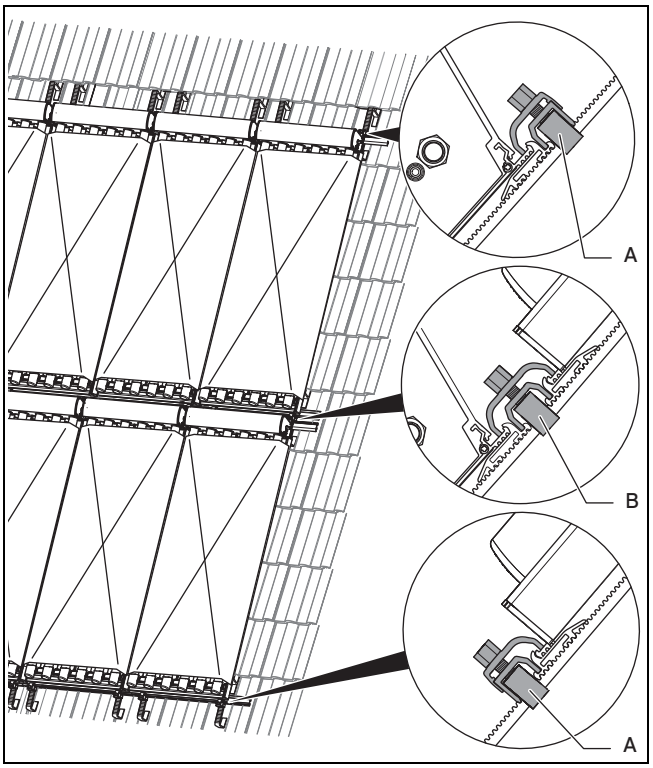
[1] 1 set for connecting to the pipelines; the collectors are connected together using the extension set
[2] valid up to 700 m above sea level

Number of VTK 1140/2 collectors	1	2	3	4	5	6
Number of VTK 570/2 collectors	**1**	**1**	**1**	**1**	**1**	**1**
Components	**Required sets**					
VTK installation set (basic set)	1 [1]					
VTK installation set (extension set)	1	2	3	4	5	6
Roof bracket set type P (pantile)	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)						
Roof bracket set type S, flat (slate)						
Roof anchor set, hanger bolt						
VTK 1140/2 rail set	1	2	3	4	5	6
VTK 570/2 rail set	1					

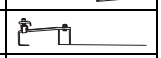
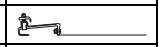
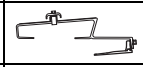
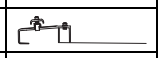
Number of VTK 1140/2 collectors	1	2	3	4	5	6
Number of VTK 570/2 collectors	1	1	1	1	1	1
Components	**Required sets**					

[1] 1 set per row for connecting to the pipelines; the collectors are connected together using the extension set
[2] Valid up to 700 m above sea level

Conditions: Collector rows: 2

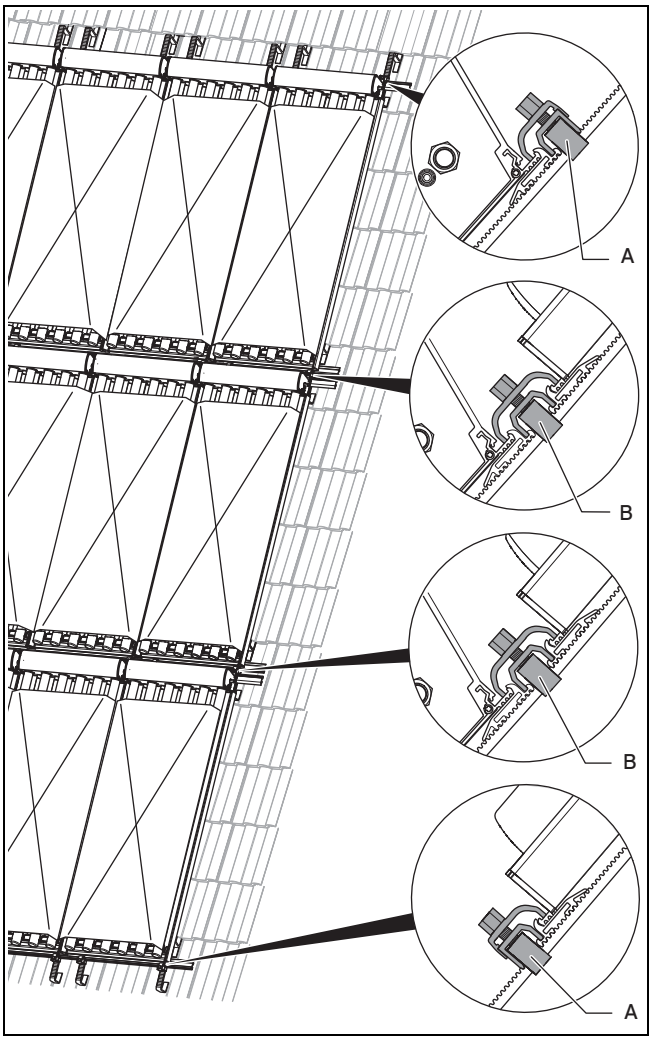


▶ Use the following table to put together the components for installation.

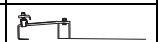
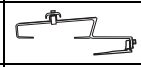
Number of VTK 1140/2 collectors per row			1	2	3	4	5	6	7
Components			**Required sets**						
VTK installation set (basic set)			2 [1]						
VTK installation set (extension set)			–	2	4	6	8	10	12
Roof bracket set type P (pantile)		**A**	1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Roof anchor set, hanger bolt									
Roof bracket set type P (pantile)		**B**	1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Roof anchor set, hanger bolt									
Rail set (2 pcs), VTK 1140/2			2	4	5	6	10	12	14

[1] 1 set per row for connecting to the pipelines; the collectors are connected together using the extension set – if the rows are also connected together so that they are flat-sealed.
[2] Valid up to 700 m above sea level

Conditions: Collector rows: 3



► Use the following table to put together the components for installation.

Number of VTK 1140/2 collectors per row			1	2	3	4	5	6	7
Components			**Required sets**						
VTK installation set (basic set)			3 [1]						
VTK installation set (extension set)			–	3	6	9	12	15	18
Roof bracket set type P (pantile)		**A**	1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Roof bracket set type P (pantile)		**B**	2 [2]	4 [2]	6 [2]	8 [2]	10 [2]	12 [2]	14 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Rail set (2), VTK 1140/2			3	6	9	12	15	18	21

[1] 1 set per row; the collectors are connected together using the extension set – if the rows are also connected together so that they are flat-sealed.
[2] Valid up to 700 m above sea level

4.1.6 Determining the number of required roof brackets

1. Ask the local building authority for the regional maximum snow load s_k.

Conditions: Maximum snow load: ≤ 3 kN/m²

► Install 4 roof brackets per collector.

Conditions: Maximum snow load: 3 < × ≤ 4.5 kN/m²

► Install 6 roof brackets per collector.

Conditions: Maximum snow load: > 4.5 kN/m²

► Compile statistics for the individual case.
► Ensure that the maximum permissible snow load per collector is 5.4 kN/m².

Note
The maximum permissible load per roof bracket type S/type P is: F_{max} = 1.875 kN.

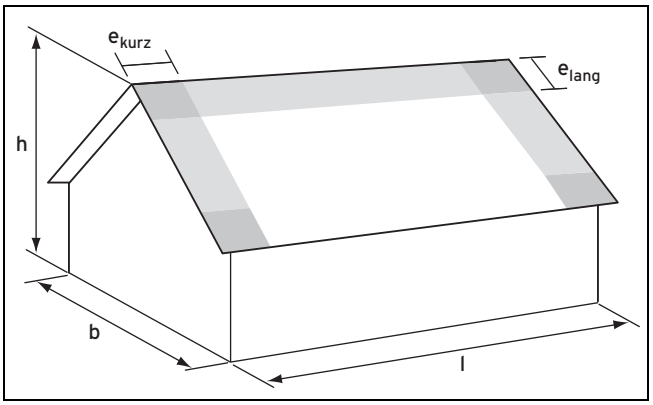
2. If you are using extension sets, ensure that the roof bracket is positioned centrally with equal clearances.

4.1.7 Defining the edge clearances of the roof brackets

Maximum lift points caused by wind loads can occur at the cut-away edges of wall and roof areas (e.g. verge and eaves). These maximum lift points result in high loads on the collectors and installation systems.

Areas in which lift points occur are called edge areas. Corner areas are zones in which edge areas overlap and especially high pull forces occur.

Edge and corner areas must not be used as installation areas.



b Building width
l Building length
h Building height

► Calculate the building width w, building height h and building length l.

► The values for the edge clearances to be observed, e_{short} and e_{long} can be found in the following tables.

b [m]	H [m]										
	5	6	7	8	9	10	11	12	13	14	15
8	1.0										
9	1.0										
10	1.0										
11	1.0	1.1									
12	1.0	1.2									
13	1.0	1.2	1.3								
14	1.0	1.2	1.4								
15	1.0	1.2	1.4	1.5							
16	1.0	1.2	1.4	1.6							
17	1.0	1.2	1.4	1.6	1.7						
18	1.0	1.2	1.4	1.6	1.8						

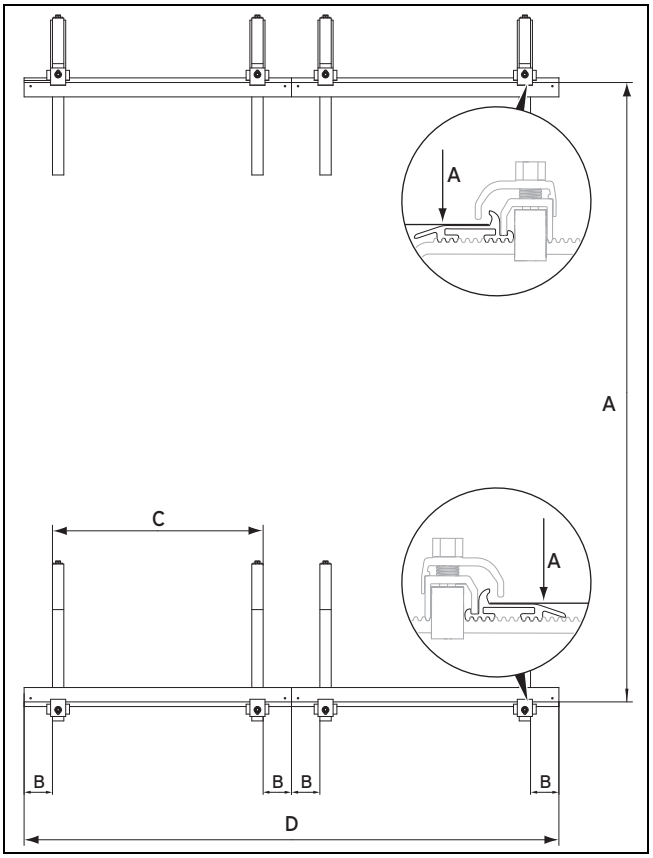
l [m]	h [m]										
	5	6	7	8	9	10	11	12	13	14	15
10	1.0										
11	1.0	1.1									
12	1.0	1.2									
13	1.0	1.2	1.3								
14	1.0	1.2	1.4								
15	1.0	1.2	1.4	1.5							
16	1.0	1.2	1.4	1.6							
17	1.0	1.2	1.4	1.6	1.7						
18	1.0	1.2	1.4	1.6	1.8						
19	1.0	1.2	1.4	1.6	1.8	1.9					
20	1.0	1.2	1.4	1.6	1.8	2.0					

► When installing the roof brackets, observe the calculated edge clearances.

4.1.8 Defining the roof bracket clearances

The roof brackets have different clearances depending on the array configuration of the collectors (adjacent or on top of each other).

4.1.8.1 Adjacent array configuration



1. Define the clearances of the roof brackets.

Quantity					
VTK 570/2	VTK 1140/2	A	B	C	D
-	1	1663 * / 1638 **	100 - 200	VTK_{1140} 997 - 1197 ----- VTK_{570} 507 - 607	1397
-	2				2794
-	3				4191
-	4				5588
-	5				6985
-	6				8382
-	7				9779
1	1				2104
1	2				3501
1	3				4898
1	4				6295
1	5				7692
1	6				8382

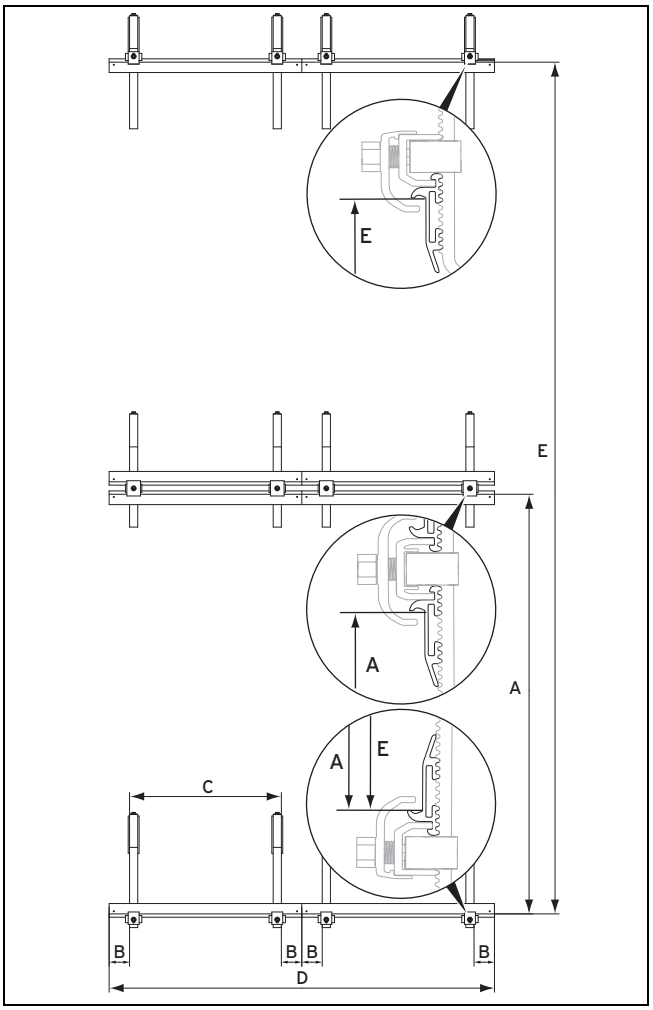
2. Ensure that there is sufficient play for the anchors.

Specifications/technical data	
Pre-installation dimension (*)	= Finished installation dimension (**) + 20-25 mm

4.1.8.2 Array configuration on top of each other

Note
In the case of roof batten clearances greater than 460 mm, the 2-row and 3-row installations are not possible. In this case, you can install the 2 or 3 rows individually (without using the same central roof anchor).

Conditions: Collector rows: 2



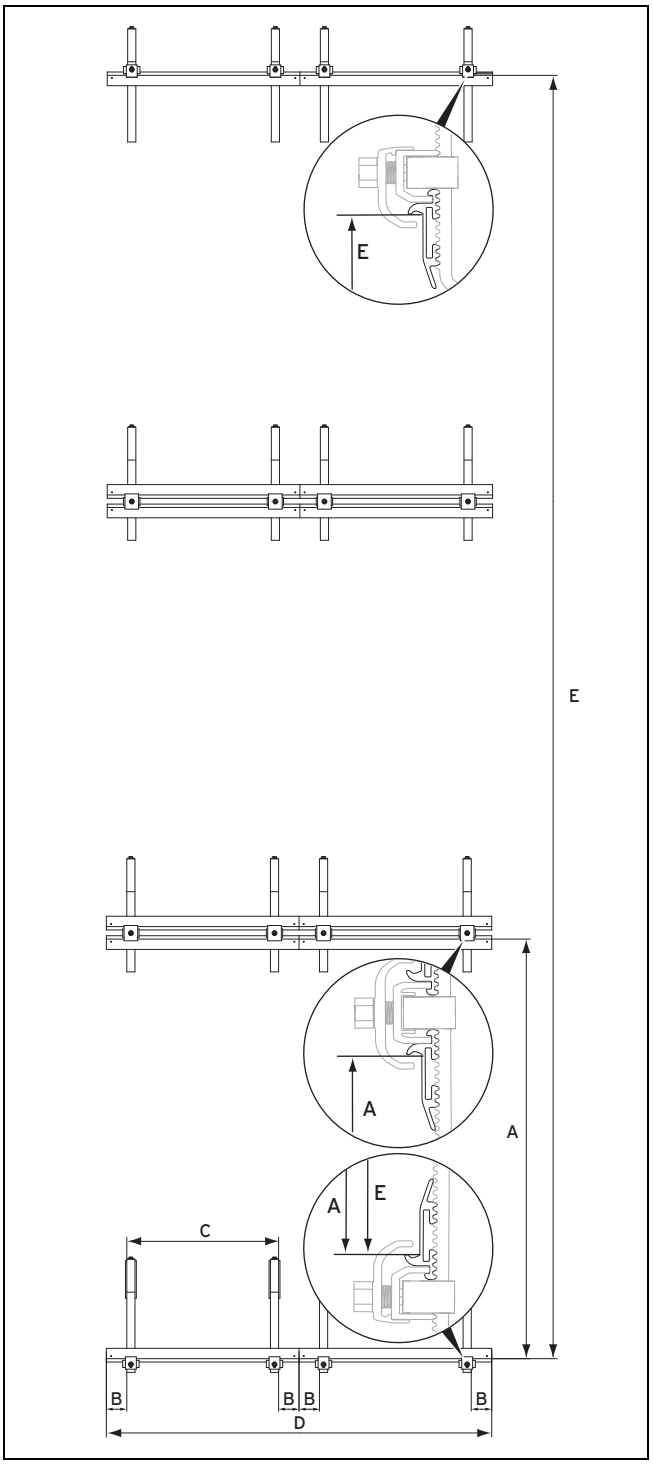
Specifications/technical data	
Pre-installation dimension (*)	= Finished installation dimension (**) + 20-25 mm

- Define the clearances of the roof brackets.

Quantity						
VTK 570/2	VTK 1140/2	A	B	C	D	E
-	1	1663 * / 1638 **	100 - 200	VTK_{1140} 997 - 1197 ----- VTK_{570} 507 - 607	1397	3322
-	2				2794	
-	3				4191	
-	4				5588	
-	5				6985	
-	6				8382	
-	7				9779	
1	1				2104	
1	2				3501	
1	3				4898	
1	4				6295	
1	5				7692	
1	6				8382	

- Ensure that there is sufficient play for the anchors.

Conditions: Collector rows: 3



► Define the clearances of the roof brackets.

Quantity		A	B	C	D	E
VTK 570/2	VTK 1140/2					
-	1	1663 * / 1638 **	100 - 200	VTK_{1140} 997 - 1197 ----- VTK_{570} 507 - 607	1397	5006
-	2				2794	
-	3				4191	
-	4				5588	
-	5				6985	
-	6				8382	
-	7				9779	
1	1				2104	
1	2				3501	
1	3				4898	
1	4				6295	
1	5				7692	
1	6				8382	

► Ensure that there is sufficient play for the anchors.

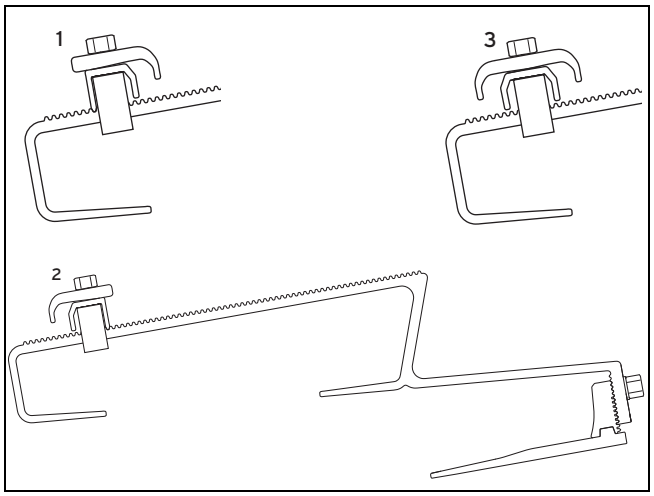
Specifications/technical data	
Pre-installation dimension (*)	= Finished installation dimension (**) + 20-25 mm

4.2 Carrying out the installation

The installation steps and notes in these instructions apply for both array configurations. Any different installation steps are clearly indicated in individual cases.

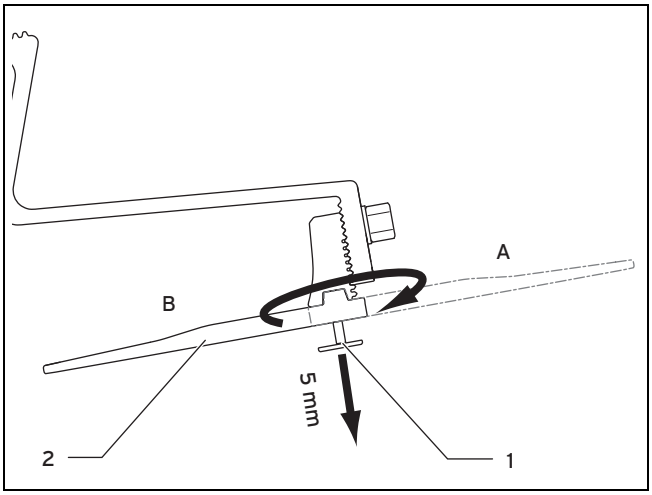
4.2.1 Installing roof brackets

4.2.1.1 Installing type P (for pantile)



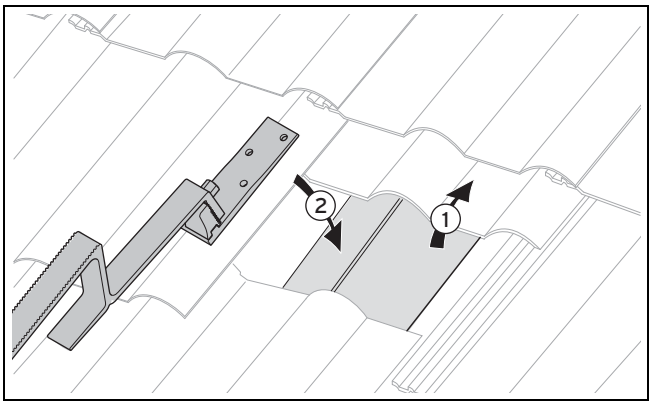
1 Lower roof bracket
2 Top roof bracket
3 Middle roof bracket

1. Use the top, middle and lower type P roof brackets shown.

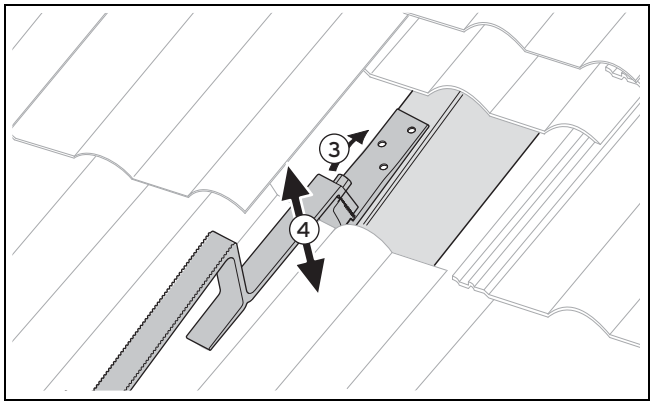


2. Secure the type P roof bracket either to the rafters **(A)** or to the roof batten **(B)**.
3. To do this, loosen the bolt **(1)** on the base of the roof bracket with the enclosed bit and unscrew the bolt by approx. 5 mm.
4. If you wish to secure the roof bracket onto the rafters, turn the base **(2)** outwards **(A)**.
5. If you wish to secure the roof bracket onto the roof batten, turn the base **(2)** inwards **(B)**.

Conditions: Fastening type: To rafters



- ▶ Define the clearances of the roof brackets. (→ Page 20)
- ▶ Expose the rafters at the corresponding position **(1)**.
- ▶ Position the roof bracket **(2)**. Ensure the correct position of the top, middle and lower roof brackets.

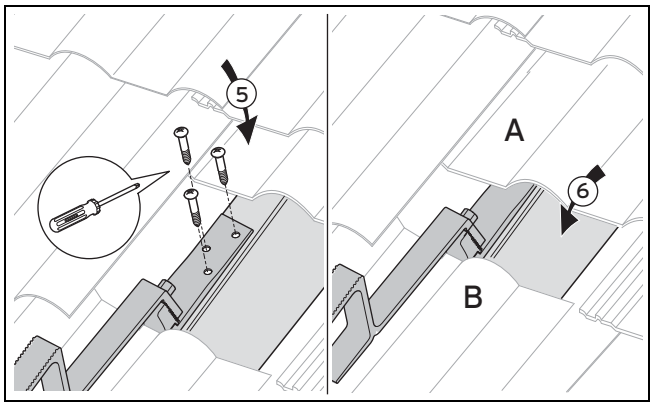


- ▶ Undo the top bolt until the height of the roof bracket can be adjusted **(3)**.

Working materials
SW 13 spanner

- ▶ Adjust the roof bracket to the height of the pantiles, so that the top part of the roof bracket lies on the roofing **(4)**.
- ▶ Tighten the top bolt.

Working materials
SW 13 spanner



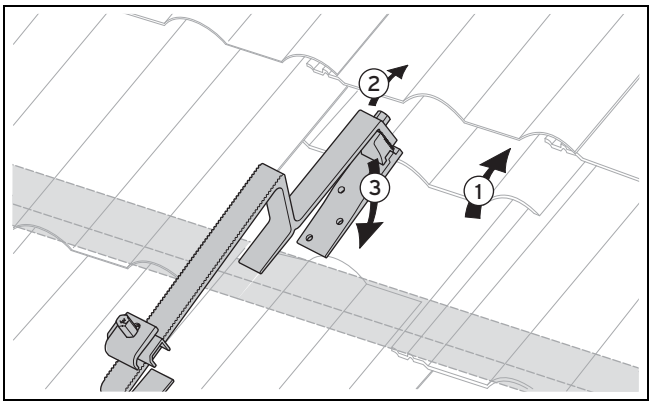
- ▶ Screw the roof bracket onto the rafters using the three bolts supplied **(5)**.
- ▶ Slide the pantiles into their original position again **(6)**.
- ▶ To ensure that the tiles lie tightly together, notch guttering onto the underside **(A)** or the top side **(B)** of the pantile using a hammer, if necessary.

Note

For some roof types, it may be necessary to offset the roof bracket laterally opposite the rafters.

To do this, use the accessory "long base" article number 0020080177 (not available in all countries).

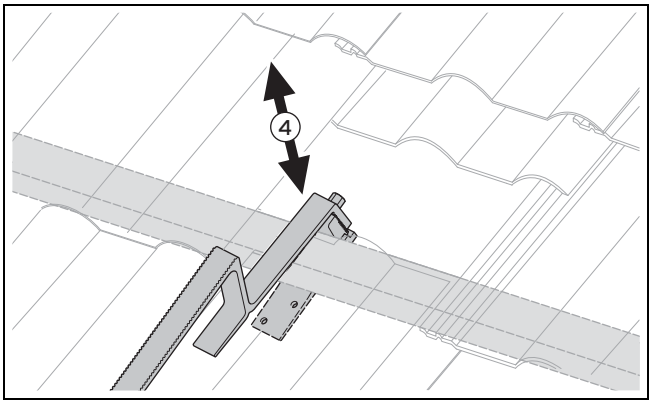
Conditions: Fastening type: To roof batten



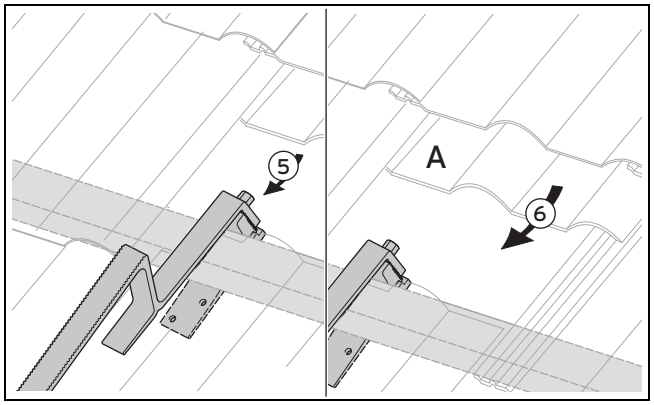
- ▶ Define the clearances of the roof brackets. (→ Page 20)
- ▶ Slide one to two pantiles upwards at the corresponding position above the roof batten **(1)**.
- ▶ Undo the top bolt until the height of the roof bracket can be adjusted **(2)**.

Working materials
SW 13 spanner

- ▶ Hang the roof bracket on the roof batten **(3)**. Ensure that the top, middle and lower roof brackets are positioned correctly.



- ▶ Adjust the roof bracket to the height of the pantiles, so that the top part lies on the roofing and the bottom part is pushed tight against the roof batten from the bottom **(4)**.
- ▶ Ensure that the roof bracket fits securely around the roof batten and pantile when it engages.

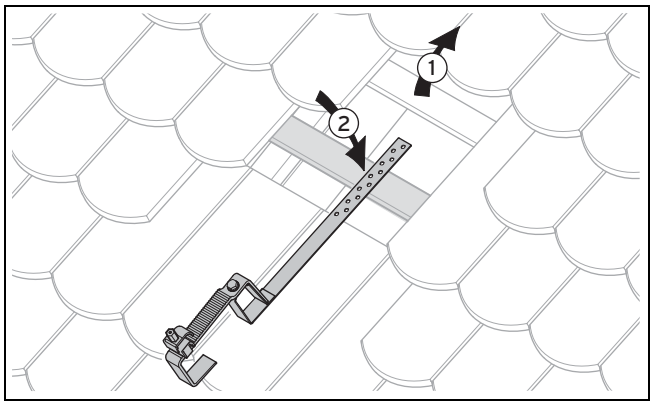


- ▶ Tighten the top bolt **(5)**.

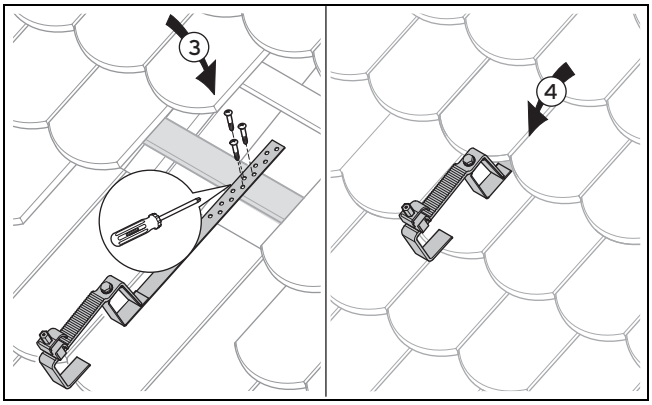
Working materials
SW 13 spanner

- ▶ Slide the pantiles into their original position again **(6)**.
- ▶ To ensure that the tiles lie tightly together, notch guttering onto the underside of the pantiles **(A)** using a hammer, if necessary.

4.2.1.2 Installing type S (for slate)

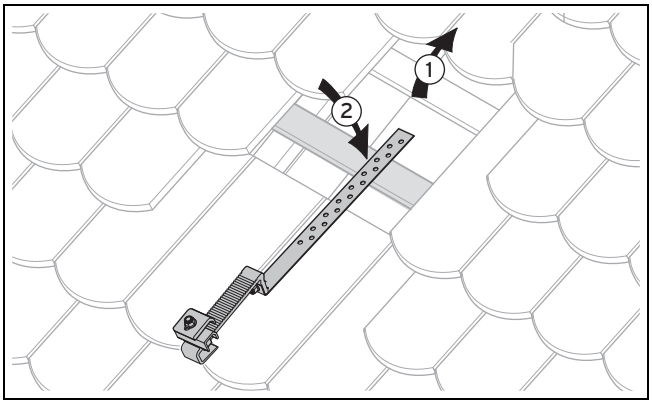


1. Define the clearances of the roof brackets. (→ Page 20)
2. At the appropriate position, expose the rafters or roof batten **(1)**.
3. Position the roof bracket. Ensure the correct position of the top, middle and lower roof brackets **(2)**.

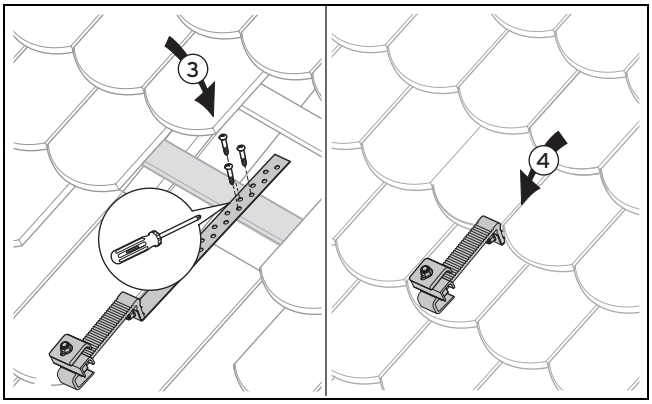


4. Screw the roof bracket onto the roof batten or rafters using the three screws supplied **(3)**.
5. Slide the pantiles into their original position again **(4)**.

4.2.1.3 Installing type S flat (for slate)

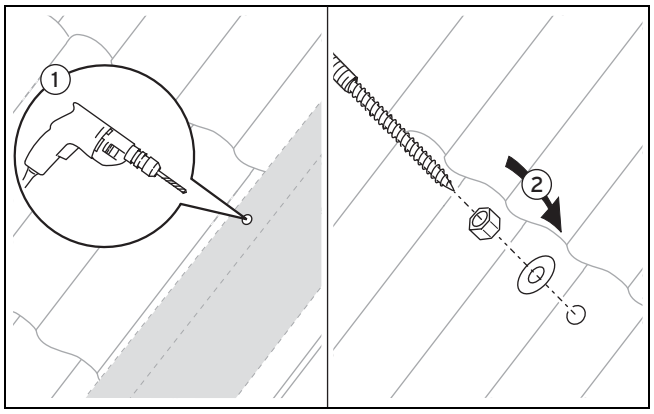


1. Define the clearances of the roof brackets. (→ Page 20)
2. At the appropriate position, expose the rafters or roof batten **(1)**.
3. Position the roof bracket. Ensure that the top, middle and lower roof brackets **(2)** are positioned correctly.

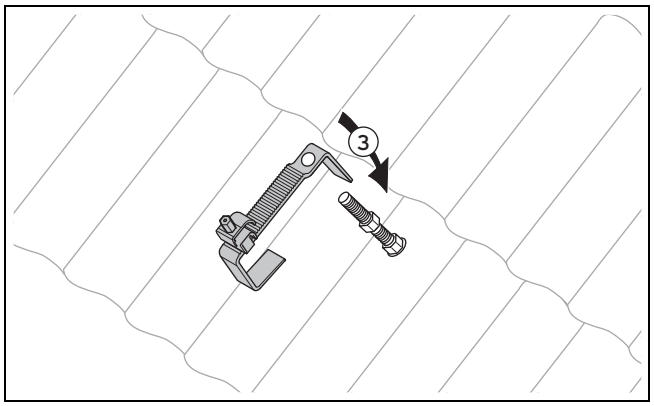


4. Screw the roof bracket onto the roof batten or rafters using the three screws supplied **(3)**.
5. Slide the pantiles into their original position again **(4)**.

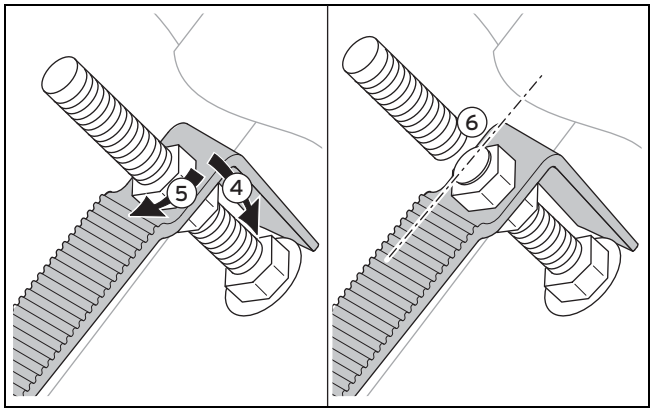
4.2.1.4 Installing the hanger bolt type



1. Define the clearances of the roof brackets. (→ Page 20)
2. At the corresponding position, drill a hole in the pantile **(1)**.
3. Tighten the hanger bolt onto the rafters through the pantile**(2)**.



4. Position the central nut so that, after inserting the upper part of the roof bracket, the front contact area lies on the roofing **(3)**. Ensure the correct positioning of the top, middle and lower roof brackets.



5. Position the roof bracket on the central nut **(4)**.
6. Screw the second nut on and tighten **(5)**.

Working materials
SW 17 spanner

7. Disconnect the threaded rod directly above the nut **(6)**.
8. Deburr the interface.

4.2.2 Installing collectors

Danger!

Personal injury and material damage due to a falling collector.

Improper fastening may cause a collector to fall.

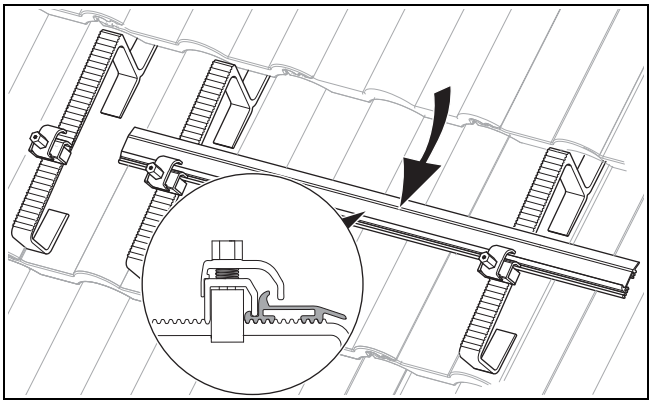
- ► Tighten the clamping elements.
- ► Check for proper tensioning by shaking the clamping blocks.
- ► If a clamping block is mobile, tighten the nut again.

1. Install the collectors on the roof as specified in the following sections.

Note

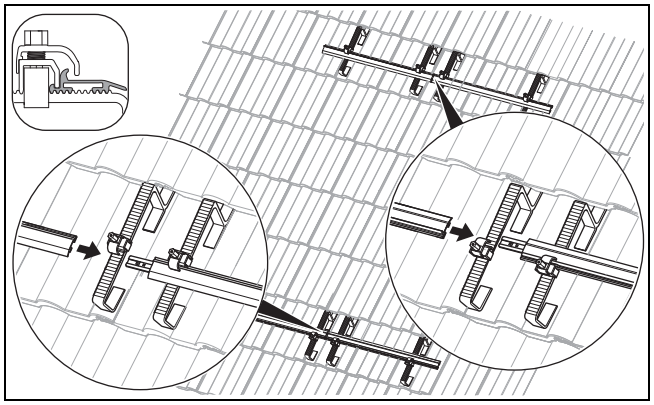
Mounting rails and clamping elements cannot be moved at the same time.

Installing mounting rails



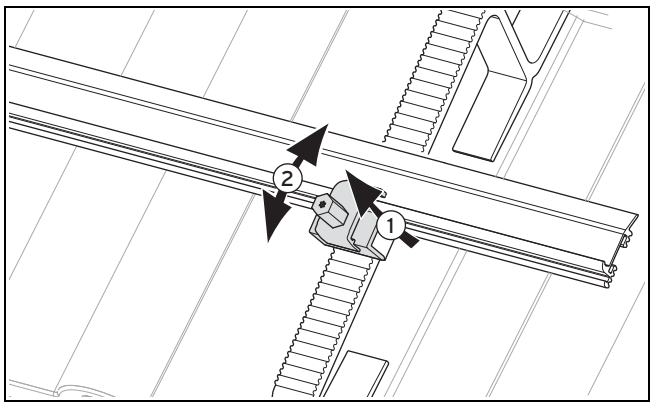
2. Secure the mounting rails with the clamping elements to the roof anchors.
3. Position the lower rail as far as possible downwards on the roof bracket.

Connecting mounting rails



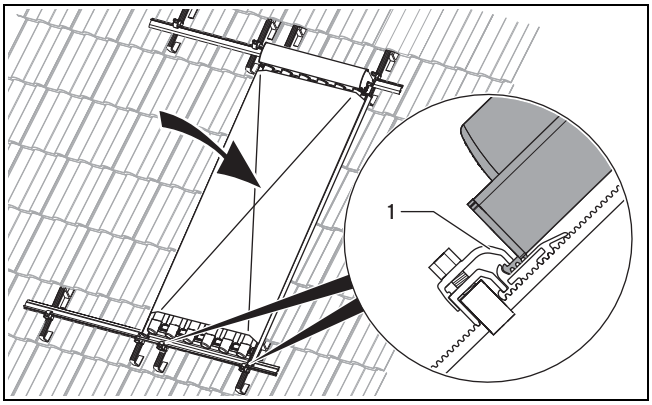
4. Insert the connecting elements laterally into the mounting rails until you feel them engage .
5. Connect the mounting rails underneath each other.
6. Secure the mounting rails with the clamping elements to the roof anchors.

Taring mounting rails



7. Secure the mounting rails horizontally.
8. Compensate for any height differences by moving the clamping elements.
9. To do this, pull the clamping element upwards **(1)**, move it **(2)** and release it so that it engages.

Laying and hooking collectors



Danger!

Risk of burns and scalding!

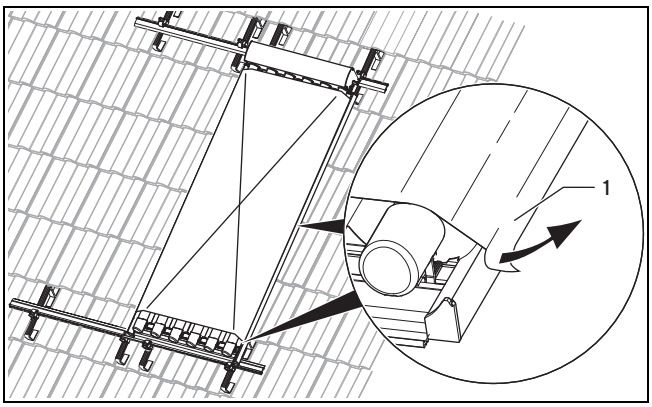
In the event of solar radiation inside the units, collectors can reach 300 °C.

- ► Avoid working in direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

10. Position the collector on the lower mounting rail (top collector).
11. Hook the collector in on the clamping elements.
12. Ensure that the top clamping block (**1**) of the clamping element is above the rail of the collector.
13. Tighten the clamping elements of the lower mounting rail.

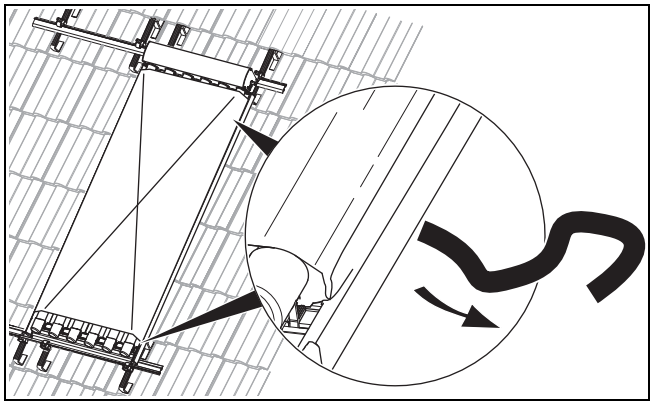
Working materials
SW 13 spanner

Loosening the sun protection film



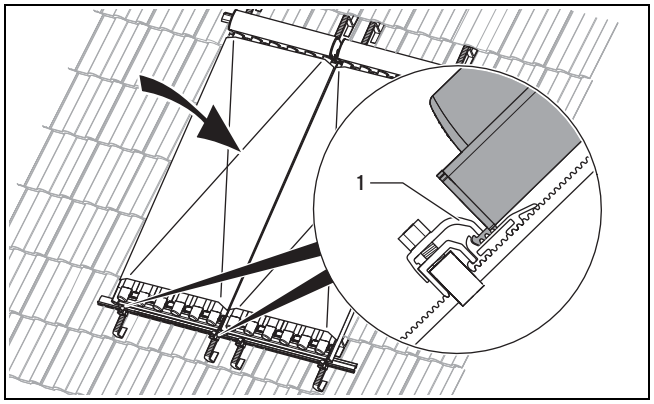
14. To ensure that the sun protection film can be easily removed after starting up the unit, loosen the sun protection film from the edges of the collector.

Removing the carrying strap



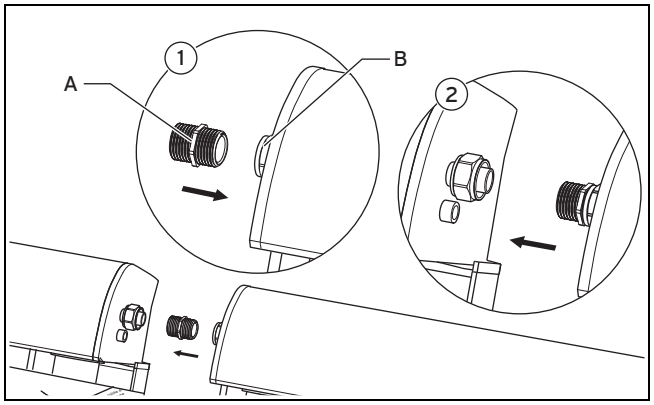
15. Remove the carrying strap.

Installing additional collectors



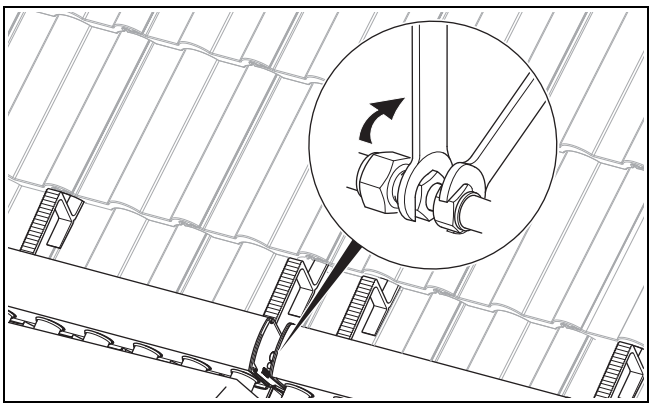
16. Position the next collector on the lower mounting rail.
17. Ensure that the upper clamping block **(1)** of the clamping element is above the rail of the collector.

Fitting connectors



18. Screw the double nipple **(A)** (from installation set **VTK** extension set, article number 0020076779) in the thread of the second collector **(B)** with the cap nut **(2)** of the first collector.
19. Push the collectors together.

Tightening the clamping ring connection



Caution.

Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

- ▶ When tightening the clamping ring connection, hold a second spanner against it.

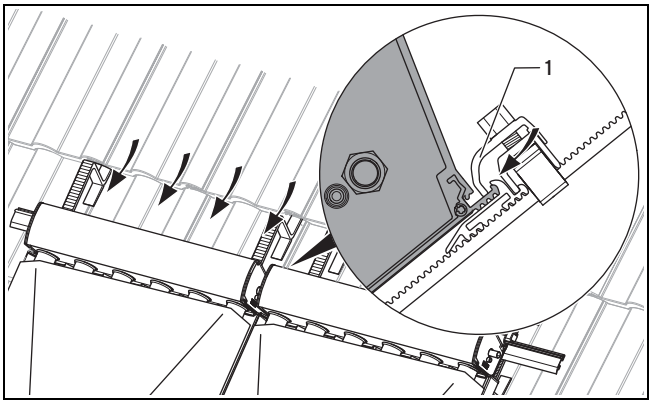
20. Screw the two cap nuts securely onto the double nipple.
21. Tighten the clamping elements of the lower mounting rail.

Working materials
SW 13 spanner

Completing collector rows

22. Install an additional collector. (→ Page 27)
23. Fit the connectors. (→ Page 27)
24. Tighten the clamping ring on the connection for both collectors. (→ Page 28)

Positioning the top mounting rails

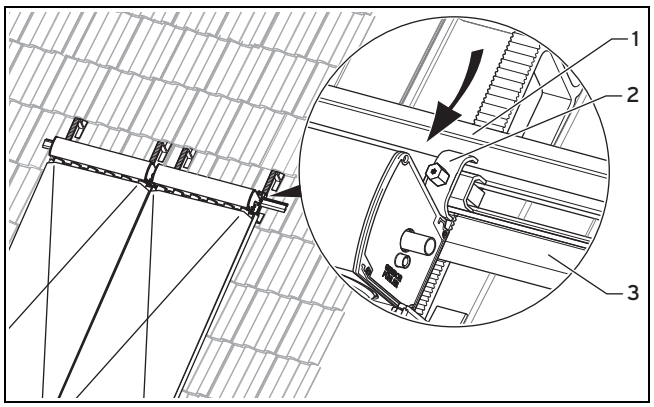


25. Slide the upper mounting rails until they are flush with the collectors.
26. Ensure that the clamping block **(1)** of the clamping elements lies over the collector rails.
27. Tighten the clamping elements of the top mounting rails.

Working materials
SW 13 spanner

Positioning the central mounting rail

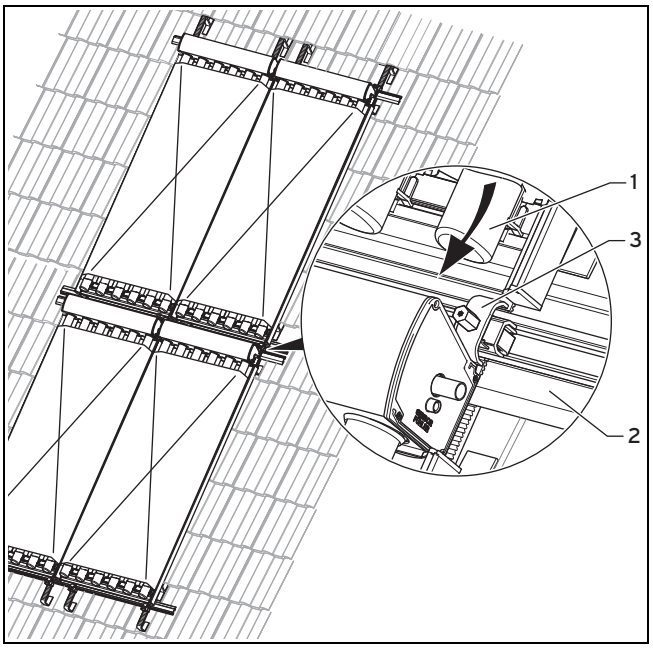
Conditions: Collector rows: 2 ... 3



- ▶ Slide the central mounting rail until it is flush with the lower collector **(3)**.
- ▶ Ensure that the top clamping block of the clamping element **(2)** is above the edge of the collector.
- ▶ Secure the mounting rail **(1)** for the next collector row to the clamping element.

Installing the upper collectors

Conditions: Collector rows: 2 ... 3

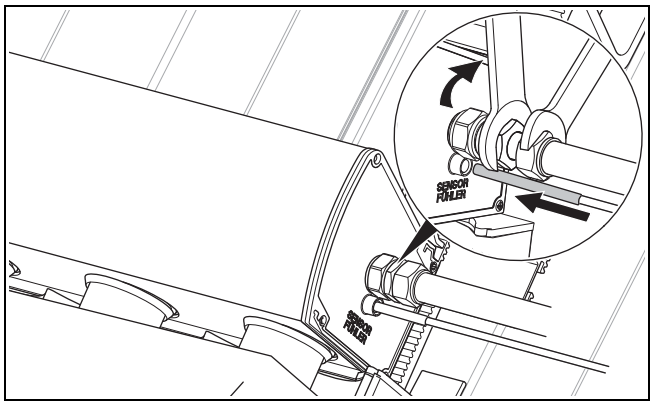


- ▶ Place the upper collector (**1**) into the central mounting rail (**2**).
- ▶ Tightly screw in the clamping elements (**3**) of the central rail.

Working materials
SW 13 spanner

- ▶ Install the collector row in the same way as for the first collector row.
- ▶ Complete the collector row. (→ Page 28)
- ▶ Position the top mounting rails. (→ Page 28)

4.2.3 Installing hydraulic connections



Caution.

Lack of tightness due to incorrect accessories.

Incorrect accessories may result in lack of tightness of the solar circuit and cause material damage.

- ▶ Only work in the solar circuit with hard soldered connections, flat seals, compression fittings or press fittings which have been approved by the manufacturer for use in solar circuits and at correspondingly high temperatures.

Caution.

Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

- ▶ When tightening the clamping ring connection, hold a second spanner against it.

1. Connect the collector flow and return to the system with the connection tubes.

Conditions: System with collector sensor

- ▶ Insert the collector sensor into the opening provided on the collector flow side ("hot side").

Note

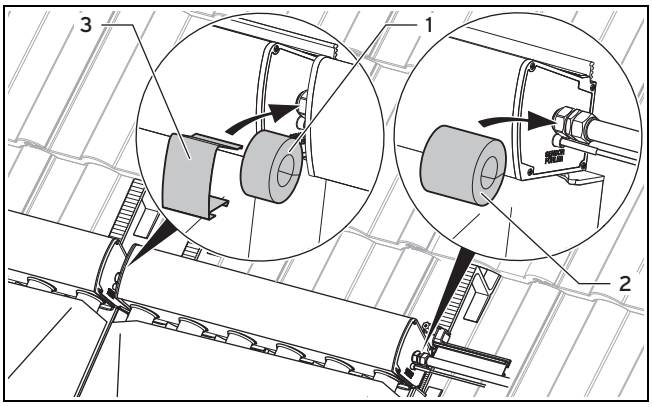
In general, the collector sensor can be attached to the right or left side of the collector field because the collectors on both sides have a corresponding opening.

Conditions: Collector rows: 2 ... 3

- ▶ Connect the collectors in accordance with the connection regulations (→ Page 14).
- ▶ Connect the collector flow and return to the system with the connection tubes.
- ▶ To do this, connect the clamping ring connection (from the installation set **VTK** basic set, article number 0020076776) to the collector.
- ▶ Connect the clamping ring connection with the connection pipework.
- ▶ Check the connections for tightness.

Insulating hydraulic connections

Conditions: Start-up carried out



- ▶ Insulate the hydraulic connections using the insulation **(1)** (from installation set **VTK** extension set, article number 0020076779).
- ▶ Cover the insulation with the cover plate **(3)** (from installation set **VTK** extension set, article number 0020076779).
- ▶ Insulate the hydraulic system connections using the insulation **(2)** (from installation set **VTK** extension set, article number 0020076779).

4.3 Completing and checking the installation

4.3.1 Checking installation

Use the following checklist to ensure that all work steps have been performed.

Operations	Yes	No	Comments
All hydraulic connections tightened	☐	☐	
Hydraulic connections routed correctly	☐	☐	
VR 11 collector sensor connected (Only for systems WITH a collector sensor)	☐	☐	
All clamping elements tightened	☐	☐	
Collectors connected to lightning protection device (Optionally for lightning protection device)	☐	☐	
Pressure testing performed (Ideally with compressed air)	☐	☐	
All connections tight	☐	☐	

	Date	Signature
All installation work has been performed correctly.	__.__.____	

4.3.2 Disposing of the packaging

The transport packaging consists largely of recyclable materials.

- ▶ Observe the applicable regulations.
- ▶ Dispose of the transport packaging properly.

5 Flat roof fitting and installation

► When fitting and installing the collectors, you must observe the chapter "Safety".

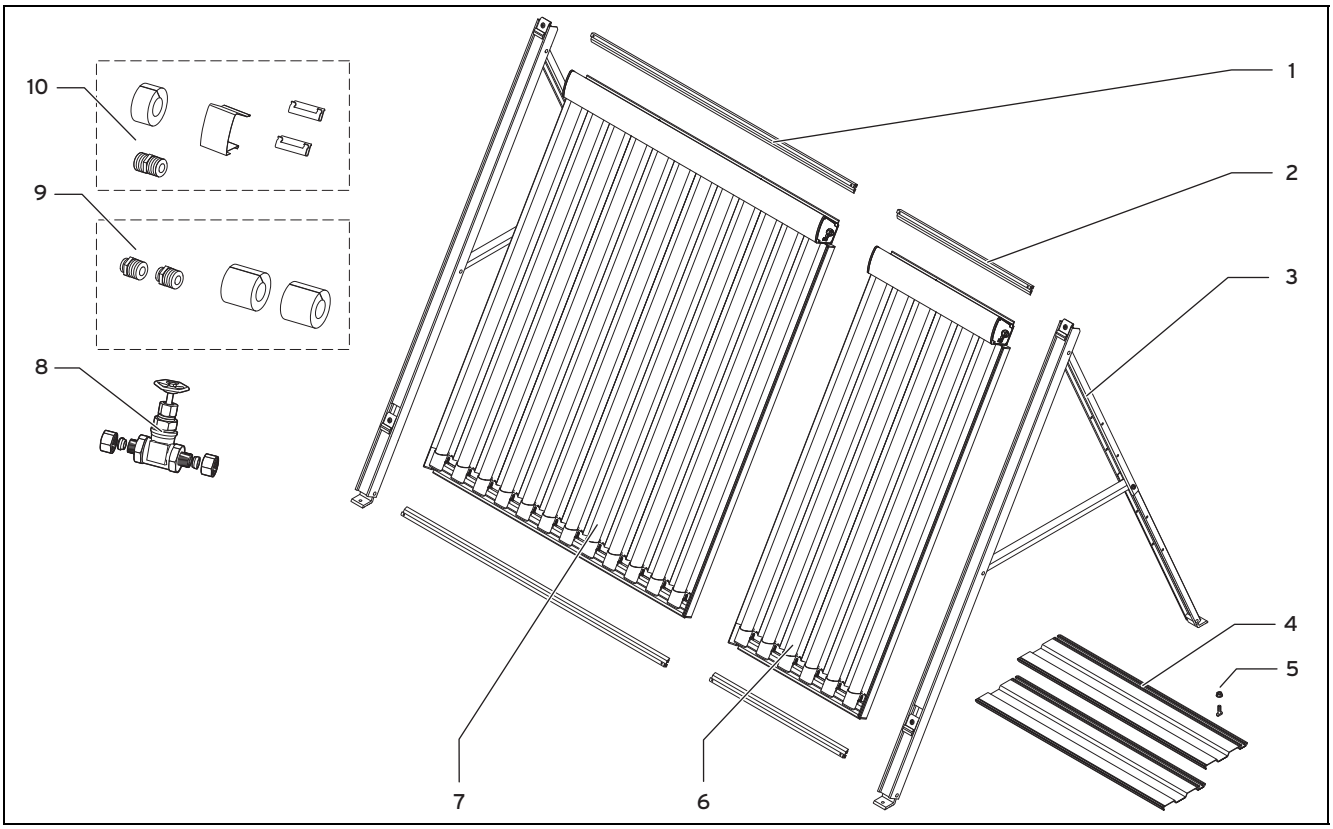
5.1 Preparing for fitting and installation

5.1.1 Delivery, transport and positioning

5.1.1.1 Storing collectors

► To prevent moisture from penetrating into the collector, always store the collectors dry and in a weatherproof area.

5.1.1.2 Checking the scope of delivery



List of materials for flat roof installation

1	VTK 1140/2 rail set 2 pc.	6	VTK 570/2 tube collector 1 pc.
2	VTK 570/2 rail set 2 pc.	7	VTK 1140/2 tube collector 1 pc.
3	Frame set 1 pc.	8	Stop valve, 2-way VTK for parallel connection 1 pc.
4	Load plates from load plate set 4 pc.	9	VTK installation set (basic set) 1 pc.
5	Hammer-head bolt and nut from load plate set 2 pc.	10	VTK installation set (extension set) 1 pc.

► Use the image to check that the installation sets are complete.

5.1.1.3 Transporting collectors

1. To protect the collectors against damage, always transport them when they are standing horizontally.
2. Transport the collectors to the roof using suitable aids.

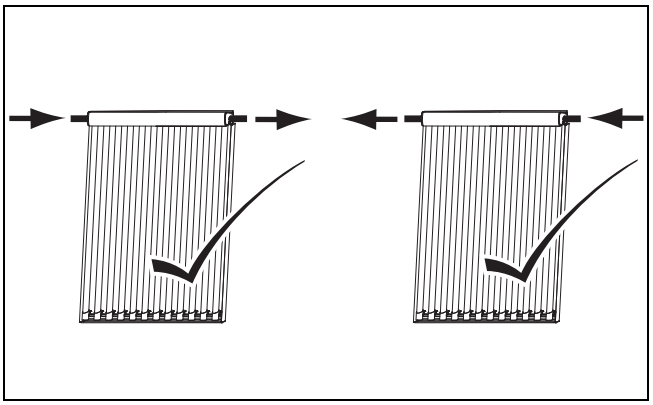
5.1.2 Complying with clearances and installation clearances

During storms, strong wind forces occur along the edges of flat roofs.

► When defining the installation position, maintain an edge clearance of at least 1 m from the roof edge.

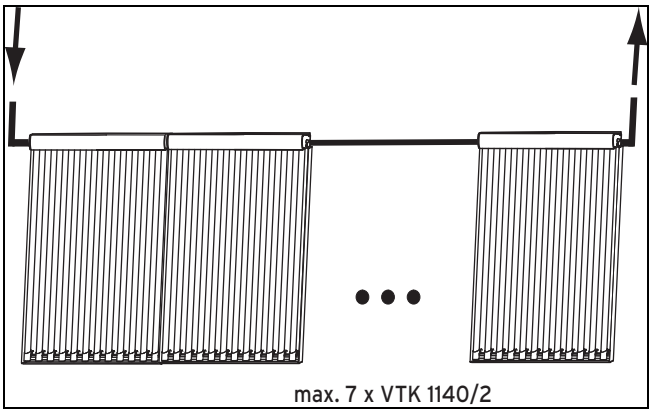
5.1.3 Selecting suitable connection

► Select the appropriate connection for the collectors.



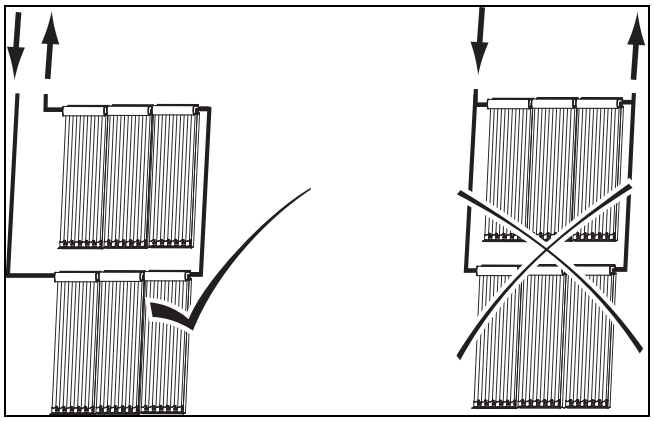
► Ensure that the solar fluid flows through the collectors either from left to right or from right to left.

Conditions: Number of **VTK 1140/2** collectors: 1 ... 7



► Switch up to 7 **VTK 1140/2** units in series (according to the 14 m² aperture surface area).

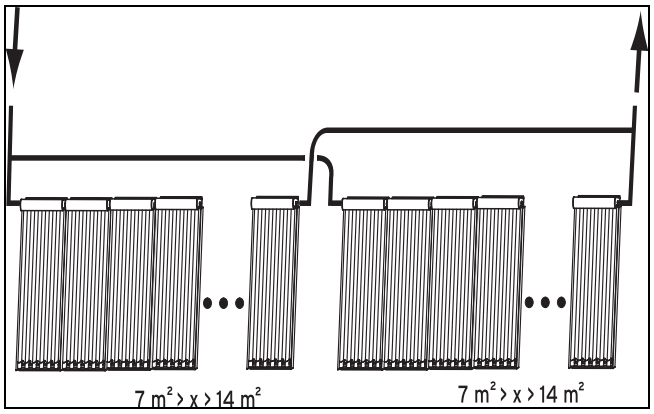
Conditions: Parallel connection, aperture surface area: ≤ 7 m²



► Always connect as many collectors as possible in series, even when several collector rows are arranged on top of each other.

Note
Up to an aperture surface area of 7 m² (accordingly for 3 pcs **VTK 1140/2** + 1 pc **VTK 570/2**), you must switch the collectors in series.

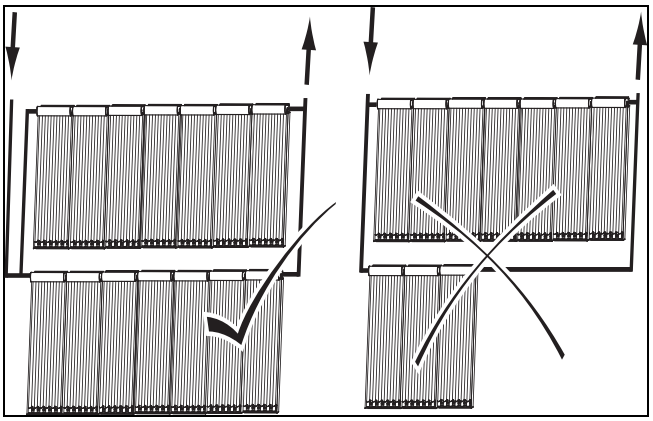
Conditions: Parallel connection, aperture surface area: ≥ 14 m²



► Set up several parallel collector rows and connect these hydraulically in parallel.

► Always connect as many collectors (at least 7 m²) as possible in series.

Conditions: Parallel connection



- To avoid pressure losses in the sub-collector fields, only use parallel connection for collector rows with the same number of collectors.
- Ensure that each sub-collector field has the same total tube length in the flow and return (Tichelmann system), in order to avoid pressure losses in the connection tubes.

5.1.4 Preparing the roof duct

Caution.

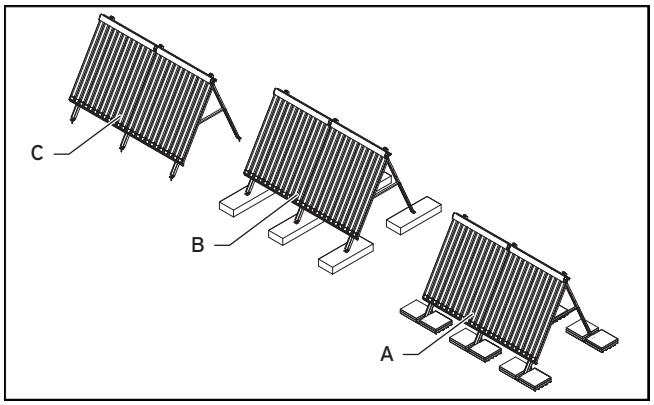
Lack of tightness due to destruction of the roof skin.

In the event of destruction of the roof skin, water may penetrate the building.

- Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- Place large-area building protection mats underneath the installation system.
- After installation, check the tightness of the building shell where there are directly connected racks.

- Commission a roofer to prepare the roof duct.

5.1.5 Selecting the installation variant



- Make a selection from the three available installation variants:

Installation variants	Meaning
A	Floating installation with load plates and load weights.
B	Floating installation without load plates. The rack must be screwed onto suitable load weights.
C	Rack screwed directly onto the roof.

5.1.6 Putting together components

► Use the following table to put together the components for installation.

Number of VTK 1140/2 collectors	1	2	3	4	5	6	7
Components	**Required sets/quantity**						
VTK installation set (basic set)	1 [1)]						
VTK installation set (basic set)	–	1	2	3	4	5	6
Installation set for open-air/flat-roof installation	2	3	4	5	6	7	8
Required rack	2	3	4	5	6	7	8
Rail set (2 pcs), VTK 1140/2	1	2	3	4	5	6	7
[1)] 1 set each per collector field for connecting to the pipelines; the collectors are connected together using the extension set							

Number of VTK 1140/2 collectors	1	2	3	4	5	6
Number of VTK 570/2 collectors	**1**	**1**	**1**	**1**	**1**	**1**
Components	**Required sets/quantity**					
VTK installation set (basic set)	1 [1)]					
VTK installation set (extension set)	1	2	3	4	5	6
Installation set for open-air/flat-roof installation	3	4	5	6	7	8
Required rack	3	4	5	6	7	8
Rail set (2 pcs), VTK 1140/2	1	2	3	4	5	6
Rail set (2 pcs), VTK 570/2	1					
[1)] 1 set each per collector field for connecting to the pipelines; the collectors are connected together using the extension set						

5.1.7 Determining the ballast load (floating installation)

Danger!

Risk of death and material damage due to excessive basic wind speeds!

The racks are designed for basic wind speeds of up to 108 km/h. If the basic wind speed at the site is greater than 108 km/h, then there can be no guarantee claim for the system.

► Only install the rack in locations where the basic wind speed is a maximum of 108 km/h.

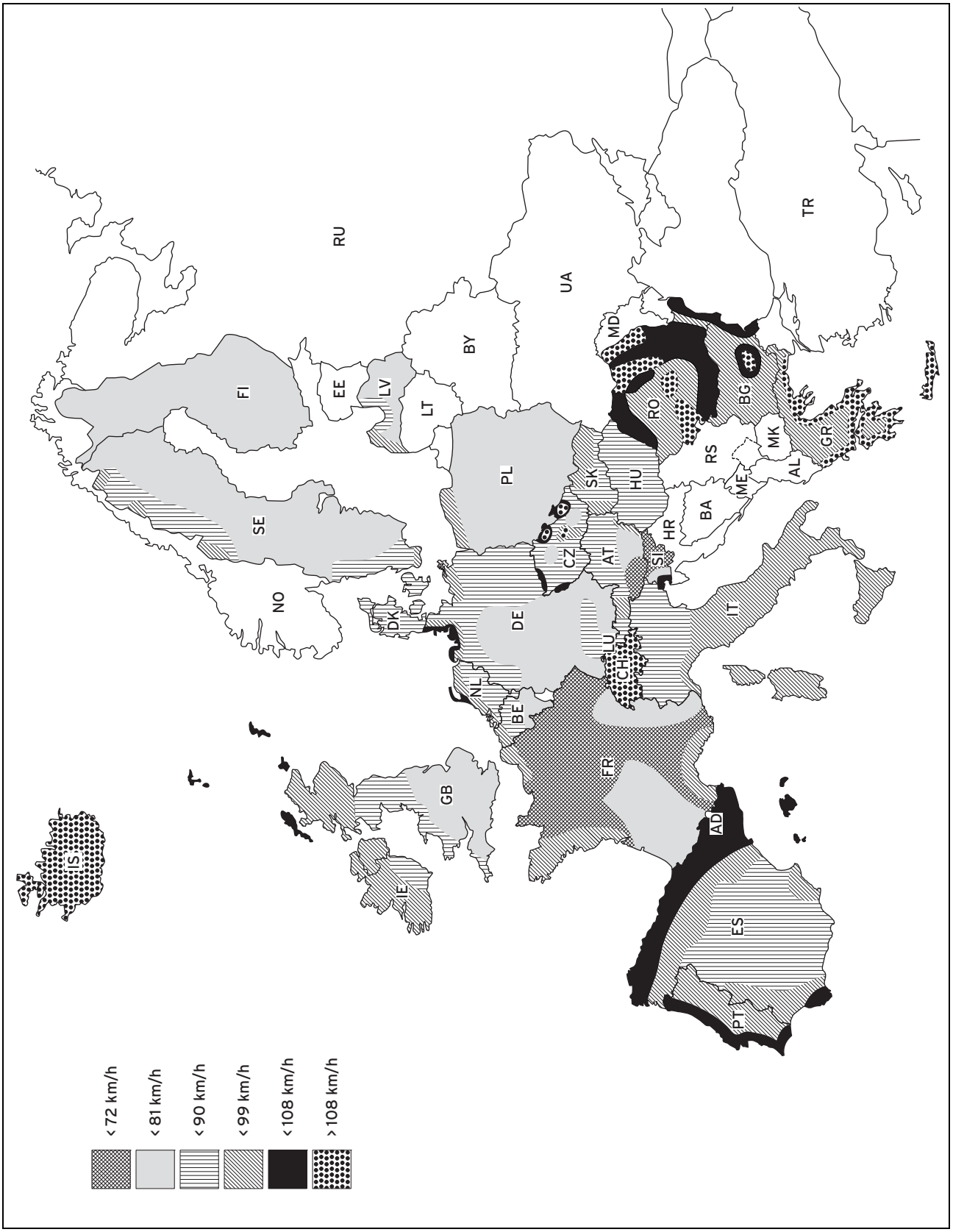
1. Please note the following for floating installation:

Installation variants	Please note
B	Weights that are firmly screwed onto the rack must consist of material capable of screw connections.
A and B	All weights must be weatherproof.

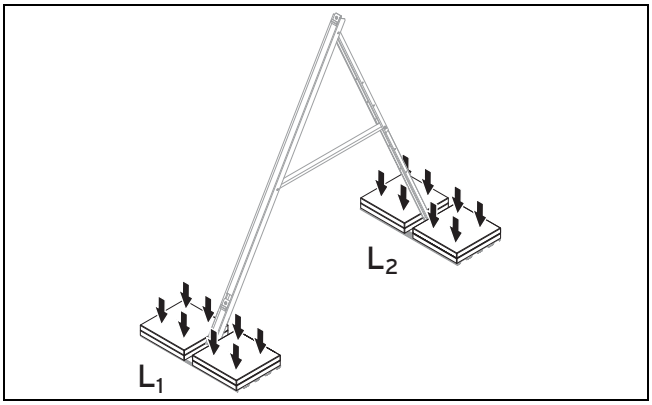
2. For detailed determination of the basic wind speed at the site and the required weights for the rack, use the Vaillant tool for dimensioning the wind and snow loads.
3. For quick determination of the basic wind speed at the site, use the following map.
4. For quick dimensioning of the required weights, use the following tables.

Note

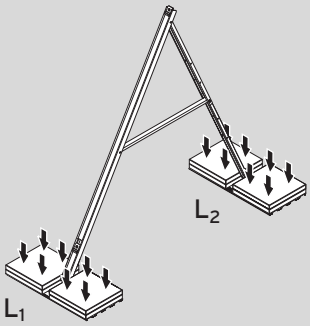
The map and tables are used for quick dimensioning of the ballast loads. Detailed dimensioning of the ballast loads is only possible using the Vaillant tool for dimensioning the wind and snow loads. If you have any questions on this subject, please contact your responsible Vaillant sales partner.

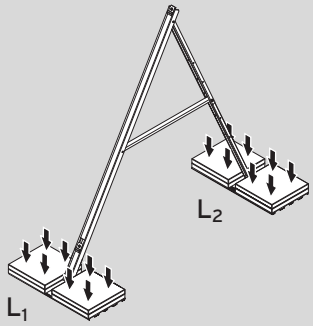


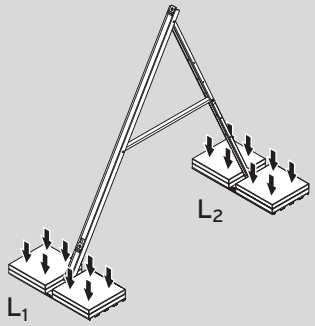
5. Use the map to determine the basic wind speed at the site.

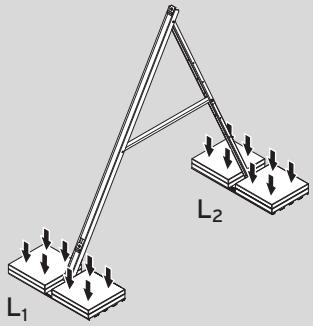


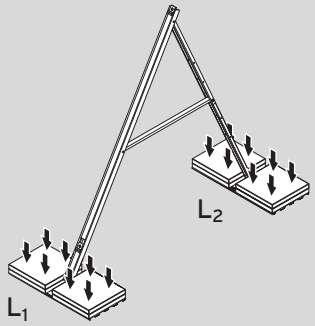
6. Use the tables to determine the required weights.

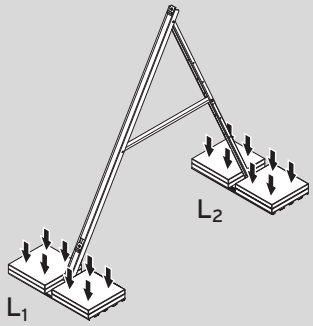
Horizontal collector position Installation angle 30°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L_1	286	359	407	30	38	45
		L_2	184	235	269	184	235	269
up to 72	Coast and islands	L_1	392	461	505	43	53	59
		L_2	259	307	345	259	307	338
up to 81	Inland	L_1	339	445	515	35	50	61
		L_2	221	296	345	221	296	345
up to 81	Coast and islands	L_1	499	588	643	58	71	79
		L_2	334	396	435	334	396	435
up to 90	Inland	L_1	445	550	621	50	66	76
		L_2	296	370	419	296	370	419
up to 90	Coast and islands	L_1	586	691	762	71	86	96
		L_2	395	469	518	395	469	518
up to 99	Inland	L_1	550	656	762	66	81	96
		L_2	370	444	518	370	444	518
up to 99	Coast and islands	L_1	727	833	903	91	107	117
		L_2	494	568	617	494	568	617
up to 108	Inland	L_1	656	797	903	81	101	117
		L_2	444	543	617	444	543	617
up to 108	Coast and islands	L_1	868	974	1079	112	127	142
		L_2	593	667	741	593	667	741

Horizontal collector position Installation angle 45°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	18-25 m	18-25 m
up to 72	Inland	L_1 L_2	299 213	372 274	421 314	30 191	30 242	30 276
up to 72	Coast and islands	L_1 L_2	406 301	476 359	521 396	30 265	30 315	30 346
up to 81	Inland	L_1 L_2	352 257	495 345	531 404	30 228	30 303	30 352
up to 81	Coast and islands	L_1 L_2	515 391	604 464	661 510	30 341	30 404	30 443
up to 90	Inland	L_1 L_2	459 345	566 433	638 492	30 303	30 377	30 427
up to 90	Coast and islands	L_1 L_2	602 462	709 550	781 609	30 402	30 477	30 526
up to 99	Inland	L_1 L_2	566 433	673 521	781 609	30 377	30 452	30 526
up to 99	Coast and islands	L_1 L_2	745 579	852 667	923 726	30 502	30 576	30 626
up to 108	Inland	L_1 L_2	673 521	816 638	923 726	30 452	30 551	30 626
up to 108	Coast and islands	L_1 L_2	888 697	995 785	1102 873	30 601	30 675	30 750

Horizontal collector position Installation angle 60°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L_1 L_2	268 297	334 377	378 430	30 196	37 247	45 281
up to 72	Coast and islands	L_1 L_2	365 414	430 491	474 539	43 271	54 320	62 351
up to 81	Inland	L_1 L_2	316 355	413 472	484 550	33 233	52 308	64 357
up to 81	Coast and islands	L_1 L_2	468 532	557 630	613 691	61 346	76 408	85 448
up to 90	Inland	L_1 L_2	413 472	519 589	590 667	52 308	70 382	82 432
up to 90	Coast and islands	L_1 L_2	555 628	661 744	731 822	76 407	94 481	106 531
up to 99	Inland	L_1 L_2	519 589	625 705	731 822	70 382	88 456	106 531
up to 99	Coast and islands	L_1 L_2	696 783	802 900	873 978	100 506	118 580	130 630
up to 108	Inland	L_1 L_2	625 705	767 861	873 978	88 456	112 556	130 630
up to 108	Coast and islands	L_1 L_2	838 939	944 1056	1050 1172	124 605	142 680	160 754

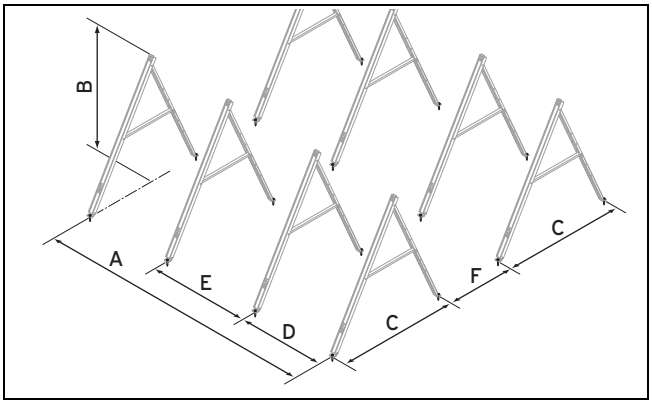
Vertical collector position Installation angle 30°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L_1 L_2	301 167	378 213	429 244	44 167	40 213	70 244
up to 72	Coast and islands	L_1 L_2	413 234	487 279	534 307	67 234	81 279	90 307
up to 81	Inland	L_1 L_2	357 201	469 268	544 313	56 201	78 268	92 313
up to 81	Coast and islands	L_1 L_2	527 303	621 359	680 395	89 303	108 359	119 395
up to 90	Inland	L_1 L_2	469 268	581 335	656 380	78 268	100 335	115 380
up to 90	Coast and islands	L_1 L_2	619 358	731 425	806 470	107 358	129 425	144 470
up to 99	Inland	L_1 L_2	581 335	694 403	806 470	100 335	122 403	144 470
up to 99	Coast and islands	L_1 L_2	768 448	881 515	955 560	137 448	159 515	174 560
up to 108	Inland	L_1 L_2	694 403	843 492	955 560	122 403	152 492	174 560
up to 108	Coast and islands	L_1 L_2	918 537	1030 605	1143 672	166 537	188 605	211 672

Vertical collector position Installation angle 45°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L_1 L_2	321 191	401 245	454 281	30 173	30 220	30 251
up to 72	Coast and islands	L_1 L_2	437 270	513 321	562 354	30 241	30 286	30 314
up to 81	Inland	L_1 L_2	379 230	495 309	572 361	30 207	30 275	30 320
up to 81	Coast and islands	L_1 L_2	555 350	652 415	713 4547	30 310	30 366	30 402
up to 90	Inland	L_1 L_2	495 309	611 388	688 440	30 275	30 342	30 388
up to 90	Coast and islands	L_1 L_2	650 414	766 493	843 545	30 365	30 433	30 478
up to 99	Inland	L_1 L_2	611 388	727 466	843 545	30 342	30 410	30 478
up to 99	Coast and islands	L_1 L_2	804 519	920 598	998 650	30 455	30 523	30 568
up to 108	Inland	L_1 L_2	727 466	882 571	998 650	30 410	30 500	30 568
up to 108	Coast and islands	L_1 L_2	959 624	1075 703	1191 781	30 546	30 613	34 681

Vertical collector position Installation angle 60°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
Basic wind speed [km/h]		Position	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L_1 L_2	297 267	372 339	421 387	30 179	30 225	37 256
up to 72	Coast and islands	L_1 L_2	406 372	477 441	522 485	30 246	30 291	35 325
up to 81	Inland	L_1 L_2	352 319	460 424	532 494	30 212	30 280	37 325
up to 81	Coast and islands	L_1 L_2	516 479	607 566	664 621	35 315	45 372	52 407
up to 90	Inland	L_1 L_2	460 424	568 529	641 599	30 280	41 348	49 393
up to 90	Coast and islands	L_1 L_2	604 564	713 669	785 739	45 370	58 438	67 483
up to 99	Inland	L_1 L_2	568 529	677 634	785 739	41 348	54 415	67 483
up to 99	Coast and islands	L_1 L_2	749 704	857 809	930 879	62 461	75 528	84 573
up to 108	Inland	L_1 L_2	677 634	821 774	930 879	54 415	71 506	84 573
up to 108	Coast and islands	L_1 L_2	893 844	1002 949	1110 1054	80 551	92 619	105 686

5.1.8 Defining the rack clearances

Conditions: Installed collectors: VTK 1140/2

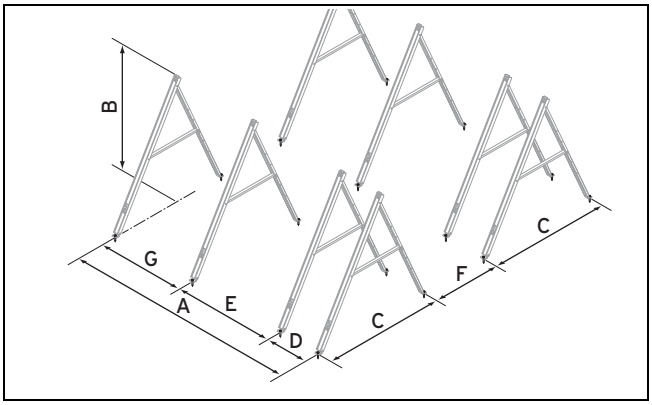


▶ Define the rack clearances.

Quantity	A	30°		45°		60°		C	D	E
		B	F [1]	B	F [1]	B	F [1]			
1	1088	1106	2420	1476	3001	1749	3267	1684	–	–
2	2466								1233	1397
3	3863									
4	5260									
5	6657									
6	8054									
7	9451									

[1] Sun elevation of 20° (winter sun)

Conditions: Installed collectors: VTK 570/2 and VTK 1140/2 in combination



▶ Define the rack clearances.

Quantity		A	30°		45°		60°		C	D	E	G
VTK 570/2	VTK 1140/2		B	F [1]	B	F [1]	B	F [1]				
1	1	1776	1106	2420	1476	3001	1749	3267	1684	543	1397	1233
1	2	3173										
1	3	4570										
1	4	5967										

Quantity			30°		45°		60°					
VTK 570/2	VTK 1140/2	A	B	F [1]	B	F [1]	B	F [1]	C	D	E	G
1	5	7364	1106	2420	1476	3001	1749	3267	1684	543	1397	1233
1	6	8761										

[1] Sun elevation of 20° (winter sun)

5.2 Carrying out the installation

5.2.1 Installing racks

Danger!

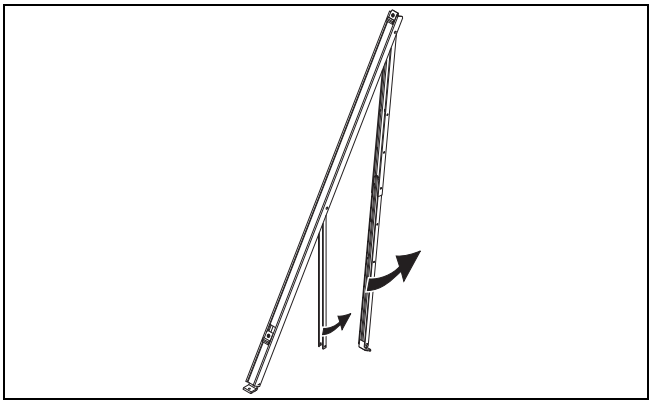
Risk of death due to falling collectors!

Unsecured collectors may fall from the flat roof due to the wind and present a danger to persons.

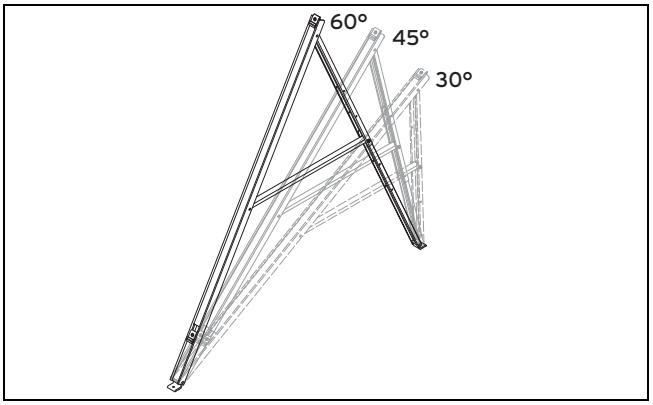
- ► Perform the following safety precautions according to the installation type.
- ► For direct connection, screw the rack properly onto the base.
- ► Only use suitable load weights.
- ► Observe the required ballast load of the load weights.

1. Determine the required number of racks.

Specifications/technical data	
For the first collector	Two racks
For each additional collector	One additional rack

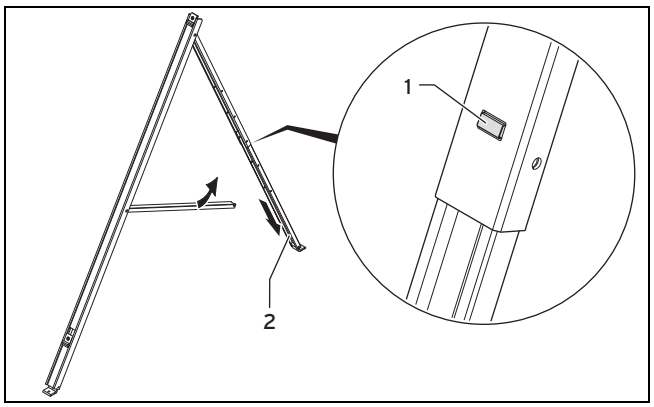


2. Fold out the first rack.

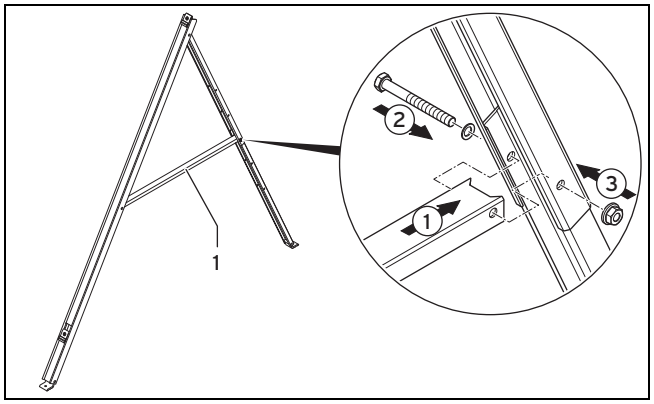


3. Select the required installation angle.

Specifications/technical data	
Installation angle	– 30° – 45° – 60°

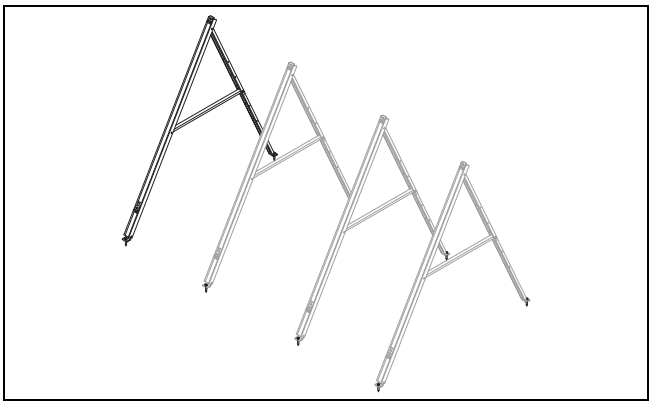


4. Push the locking button **(1)** on the telescopic rail.
5. Pull the telescopic rail **(2)** into the desired installation angle and allow the locking button to engage again.



6. Position the crossbeams **(1)** such that their fastening holes lie between the corresponding threaded holes in the telescopic rail.
7. To secure the rack, insert the fixing screw **(2)** through all rails.
8. Secure the fixing screw **(2)** with the self-locking nuts **(3)**.
9. Tighten the nuts.

Conditions: Type of installation: Direct mounting



Screwing on the rack

Caution.

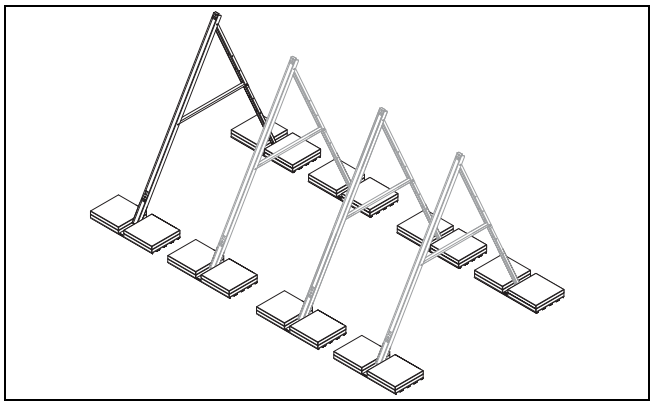
Lack of tightness due to destruction of the roof skin.

In the event of destruction of the roof skin, water can penetrate the building.

- ► Check the tightness of the roof skin after tightening screw connections.
- ► Restore the tightness of the roof skin if necessary.

- ► Define the required rack clearances as described in the chapter "Defining rack clearances".
- ► Drill the required holes at the defined positions.
- ► Secure the rack with fastenings appropriate to the base (diameter: at least 10 mm).
- ► Mount as many racks as you need to hold the collectors.

Conditions: Type of installation: Floating installation (with load plates)



Preparing load plates

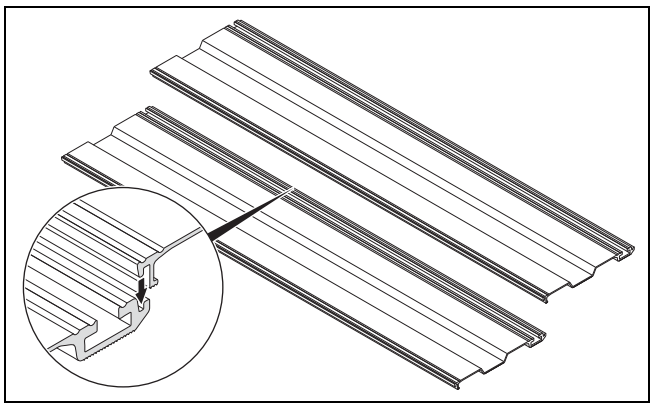
Caution.

Lack of tightness due to destruction of the roof skin.

In the event of destruction of the roof skin, water may penetrate the building.

- ► Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- ► Place large-area, non-slip building protection mats underneath the installation system.

- ► If the roof is covered with gravel, remove the gravel at the places where you wish to position the load plates, and use non-slip building protection mats to protect the roof skin.

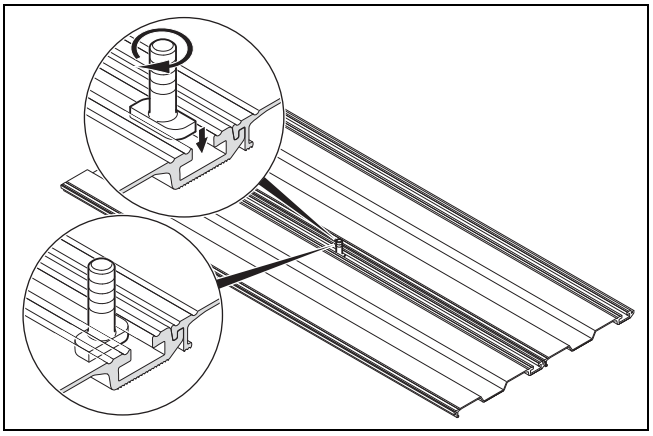


- ► Connect two load plates as shown in the illustration.
- ► Connect two additional load plates as shown in the illustration.

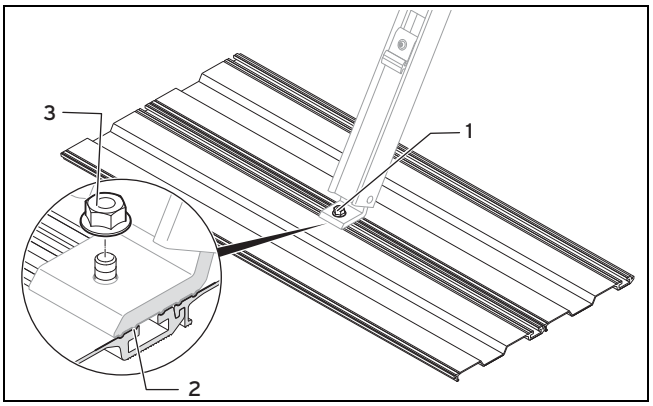
Note

For each rack, you will need four load plates: one pair each for the front and rear rack feet.

- Align the load plates approximately in their final position on the flat roof.



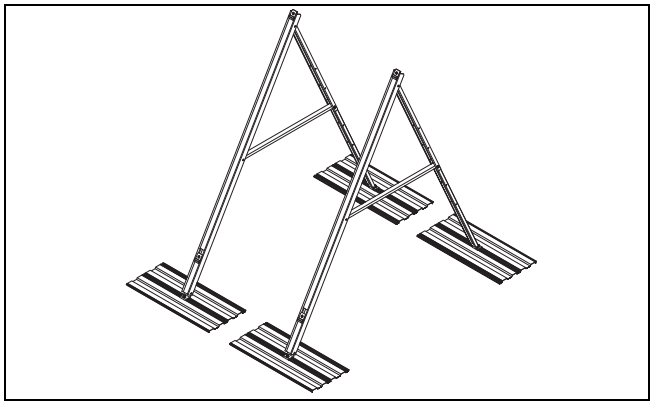
- Insert the first hammer-head bolt centrally in the groove between the first two load plates.
- To secure the hammer-head bolt, turn it by 90° in a clockwise direction.
- Secure the second hammer-head bolt in the same way between the other two load plates.



Screwing the rack onto load plates and aligning

- If you install the **VTK 570/2** collectors, turn the load plates by 90° so that the load plates do not overlap.
- Take hold of the first rack that is already secured in the installation angle.
- Position the front rack feet above the hammer-head bolt **(1)**.
- When positioning the rack feet, ensure that the anti-rotation lock **(2)** engages.
- Secure the rack feet with the self-locking nut **(3)**.
- Secure the rear rack feet in the same way on the other two load plates.

  ◁ The first rack is installed so that it is stable.

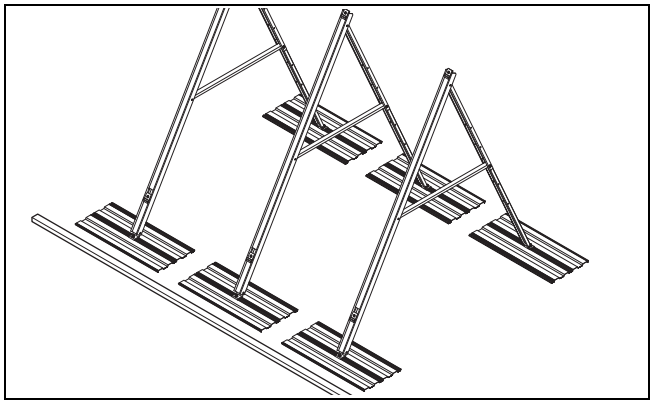


- Install the second rack on the load plates as described above.
- Mount as many racks and load plates as you need to hold the collectors.

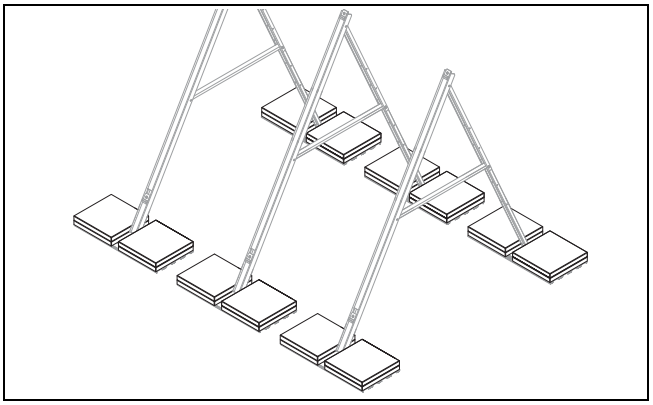
Note

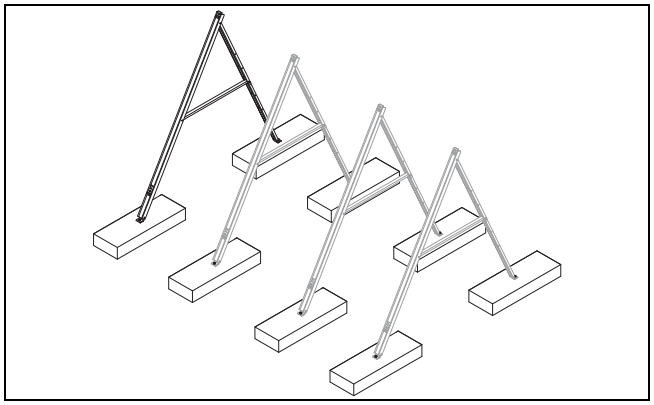
For one collector, you will need two racks.

For each additional adjacent collector, you will need an additional rack.



- Align all racks with the load plates in their final position on the flat roof.
- The rack clearances can be found in the chapter "Defining rack clearances".





Placing load weights on load plates

- ► Transport the required number of loading weights to the flat roof.
- ► Place the load weights on the load plates as shown above.
- ► Ensure that the distance between the loading weights and the racks is as small as possible.

Danger!

Risk of death due to inadequate fastening of the load weights onto the load plates!

If the load weights are inadequately secured on the load plates, collectors could fall from the roof and cause life-threatening accidents.

- ► Secure all load weights on the load plates adequately against slipping and tilting.

- ► Distribute the load weights evenly over the load plates.

Conditions: Type of installation: Floating installation (without load plates)

Preparing weights

Caution.

Lack of tightness due to destruction of the roof skin.

In the event of destruction of the roof skin, water may penetrate the building.

- ► Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- ► Place large-area, non-slip building protection mats underneath the installation system.

- ► If the roof is covered with gravel, remove the gravel at the places where you wish to position the weights, and use non-slip building protection mats to protect the roof skin.
- ► Define the required rack clearances as described in the chapter "Defining rack clearances".

Note

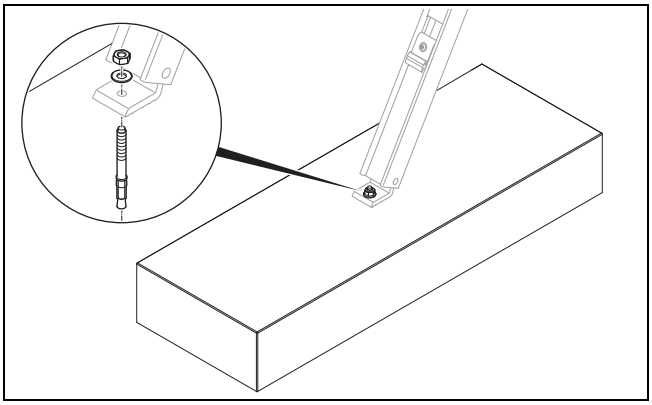
For each rack, you need two equal weights. For the first collector, you therefore need four weights. For each additional collector, you will need an additional rack.

- ► Transport the required number of weights to the flat roof.
- ► Lay the weights in the final positions of the installation site.

Note

The four weights for holding two racks for a collector are very heavy. Therefore, it is advisable to determine the final position and orientation of the weights before screwing on the rack and laying the weights there.

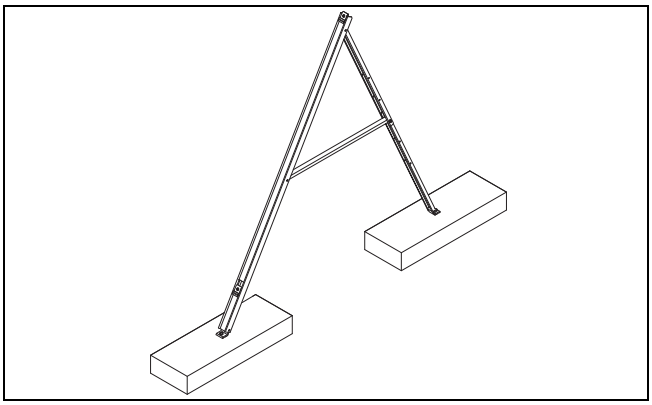
- ► Select a suitable fastening material for the weights used (diameter: at least 10 mm).
- ► Drill a hole into the centre of each weight.



Screwing the rack onto weights

- ▶ Take hold of the first rack that is already secured in the installation angle.
- ▶ Screw the front rack feet onto the first weight.
- ▶ Screw the rear rack feet onto the second weight.

  ◁ The first rack is installed so that it is stable.



- ▶ Install the second rack on the next two weights as described above.
- ▶ Fit as many racks as you need to hold the collectors.

5.2.2 Installing collectors

Danger!

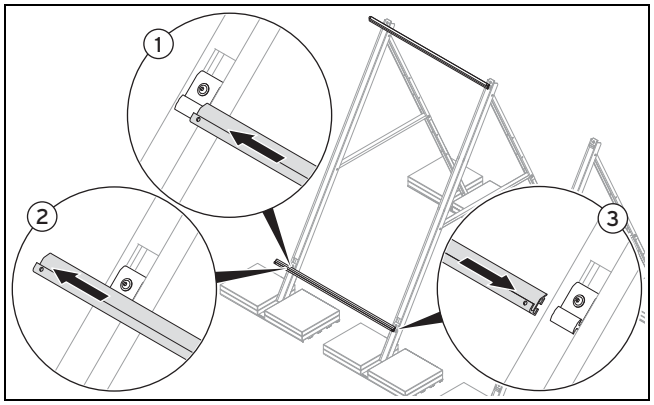
Personal injury and material damage due to a falling collector.

Improper fastening may cause a collector to fall.

- ▶ Tighten the clamping elements.
- ▶ Check for proper tensioning by shaking the clamping blocks.
- ▶ If a clamping block is mobile, tighten the nut again.

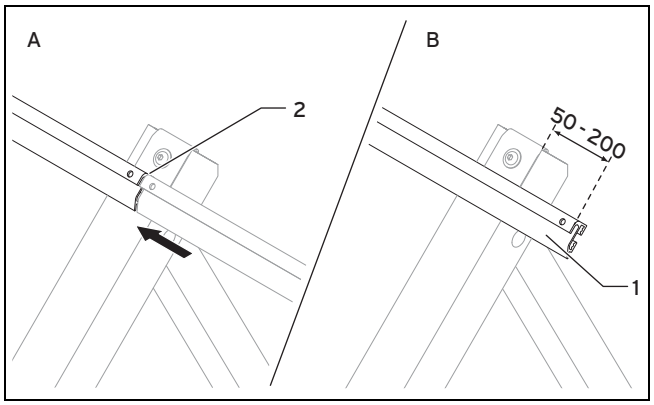
1. Install the collectors on the roof as specified in the following sections.

Sliding on mounting rails



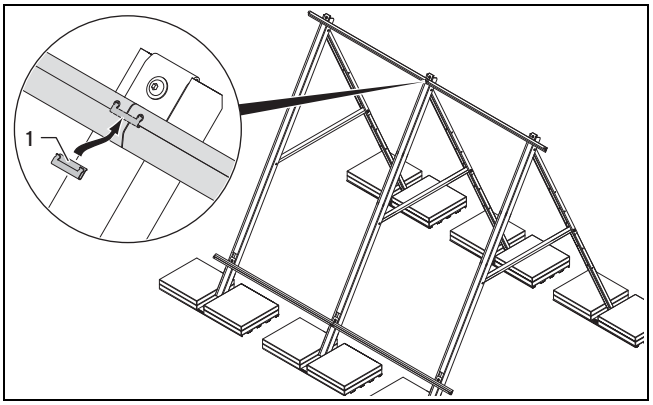
2. Slide the two mounting rails (top and bottom) onto the brackets, as shown in the image.
3. Ensure that the open side of the bottom mounting rail is facing upwards and that the open side of the top mounting rail is facing downwards.
4. First slide the mounting rail onto one bracket **(1)**.
5. Slide the mounting rail a little outwards **(2)**.
6. Then slide the mounting rail back to the other bracket **(3)**.
7. Perform these steps one after the other for all racks.

Fitting mounting rails to several racks



8. When installing several collectors next to each other, allow the mounting rails to end in the centre of the brackets **(A)**.
9. Allow the mounting rails on the first and last rack to protrude 50-200 mm over the edge **(B)**.

Connecting mounting rails

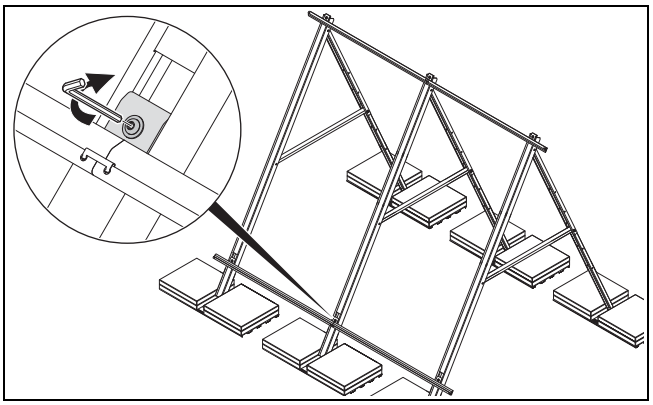


10. Clamp the rail connector **(1)** into the mounting rails.
11. Ensure that the rail connector **(1)** engages in the holes of the mounting rails.

Note

After installation, the rail connectors are no longer accessible.

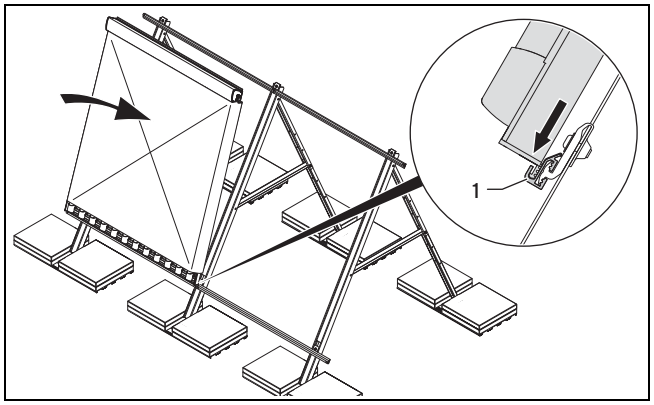
Securing the mounting rails at the bottom



12. Screw the brackets tightly onto the lower mounting rails.

Working materials
5 mm Allen key

Hooking the collector in at the bottom



Danger!

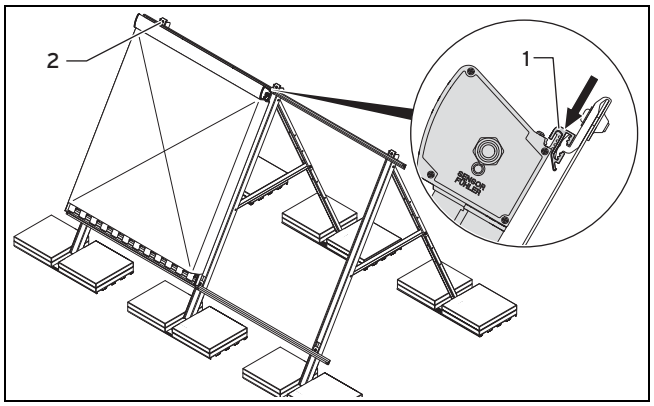
Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

- ► Avoid working in direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

13. Place the collector so that its lower edge is in the profile of the mounting rail **(1)** (upper collector). Ensure that the mounting rail **(1)** surrounds the lower edge of the collector.

Securing the collector at the top

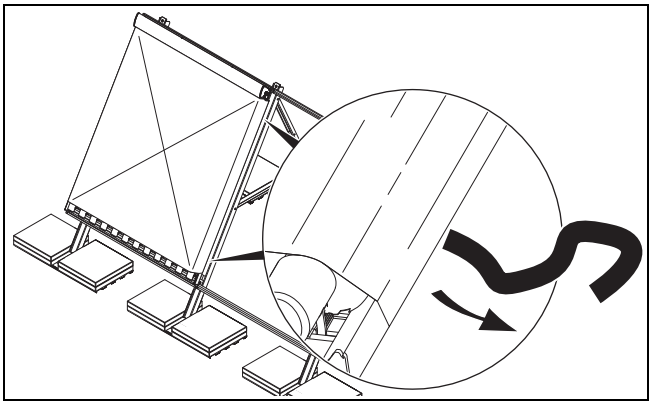


14. Slide the left side of the top mounting rail **(1)** until it is flush with the collector.
15. Ensure that the mounting rail **(1)** surrounds the top edge of the collector.
16. Screw the bracket securely on the top left **(2)**.

Working materials
5 mm Allen key

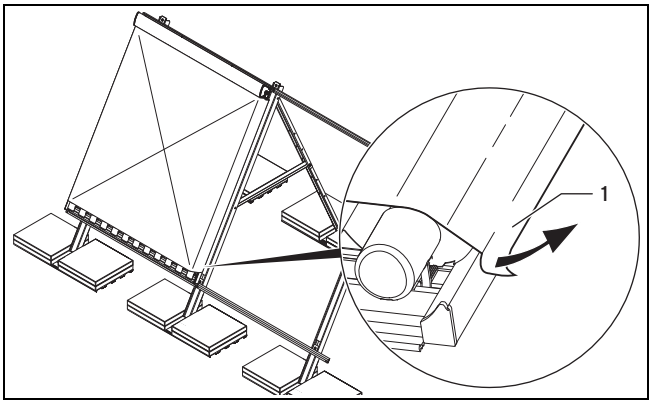
17. Ensure that the mounting rail does not slip while you are tightening the screw.

Removing the carrying strap



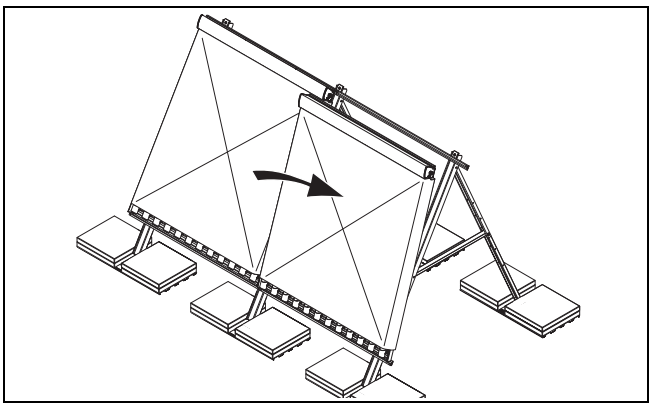
18. Remove the carrying strap.

Loosening the sun protection film



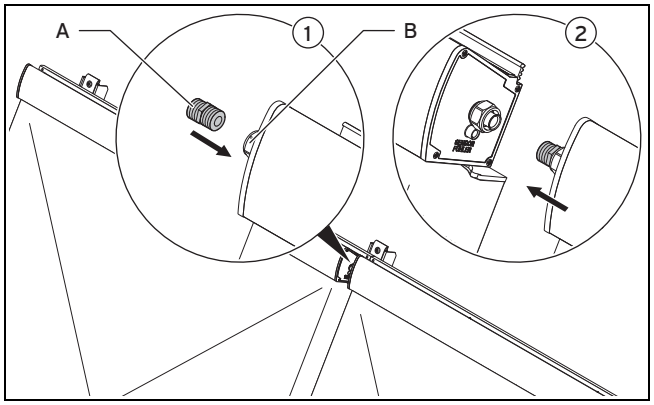
19. To ensure that the sun protection film can be easily removed after starting up the unit, loosen the sun protection film from the edges of the collector **(1)**.

Installing additional collectors



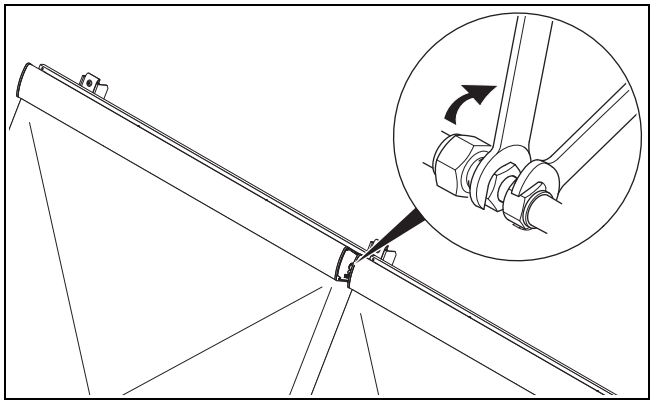
20. Position the next collector on the lower mounting rail so that there is a clearance of approx. 10 cm from the first collector.

Fitting connectors



21. Screw the double nipple **(A)** (from installation set **VTK** extension set, article number 0020076779) in the thread of the second collector **(B)** with the cap nut of the first collector (**(1)** and **(2)**).
22. Push the collectors together.

Tightening the clamping ring connection



Caution.

Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

- When tightening the clamping ring connection, hold a second spanner against it.

23. Screw the two cap nuts securely onto the double nipple.

Completing the installation of the collector

24. Slide the second top mounting rail until it is flush with the collector.
25. Screw the second top mounting rail tightly onto the mounting rail of the first collector using the corresponding bracket.

Working materials
5 mm Allen key

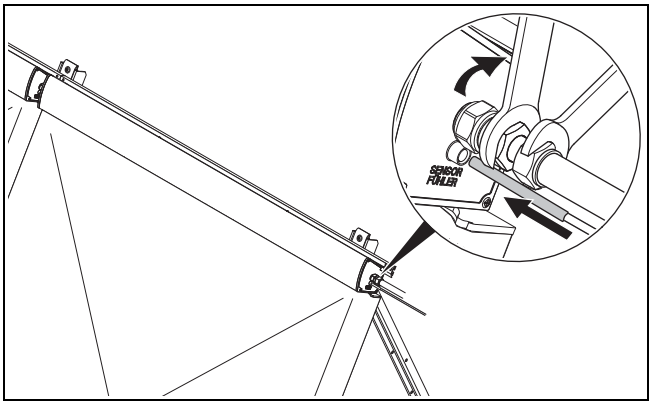
26. Remove the carrying strap. (→ Page 53)
27. Loosen the sun protection film from the edges of the collector. (→ Page 53)

Completing collector rows

Conditions: Not all collectors in a row have been installed yet.

- ► Install an additional collector. (→ Page 53)
- ► Fit the connectors. (→ Page 53)
- ► Tighten the clamping ring connection. (→ Page 53)

5.2.3 Installing hydraulic connections



Caution.

Lack of tightness due to incorrect accessories.

Incorrect accessories may result in lack of tightness of the solar circuit and cause material damage.

- ► Only work in the solar circuit with hard soldered connections, flat seals, compression fittings or press fittings which have been approved by the manufacturer for use in solar circuits and at correspondingly high temperatures.

Caution.

Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

- ► When tightening the clamping ring connection, hold a second spanner against it.

1. Connect the collector flow and return to the system with the connection tubes.
2. To do this, connect the clamping ring connection (from the installation set **VTK** basic set, article number 0020076776) to the collector.
3. Connect the clamping ring connection with the connection pipework.
4. Check the connections for tightness.

Conditions: System with collector sensor

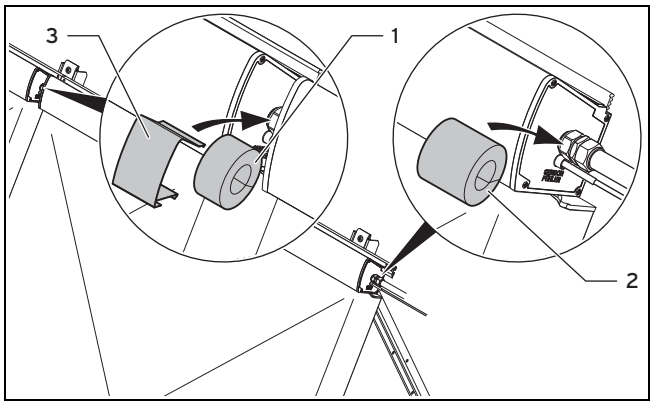
- ► Insert the collector sensor into the opening provided on the collector flow side ("hot side").

Note

In general, the collector sensor can be attached to the right or left side of the collector field because the collectors on both sides have a corresponding opening.

Insulating hydraulic connections

Conditions: Start-up carried out



- ► Insulate the hydraulic connections using the insulation **(1)** (from installation set **VTK** extension set, article number 0020076779).
- ► Cover the insulation with the cover plate **(3)** (from installation set **VTK** extension set, article number 0020076779).
- ► Insulate the hydraulic system connections using the insulation **(2)** (from installation set **VTK** extension set, article number 0020076779).

5.3 Completing and checking the installation

5.3.1 Checking installation

Use the following checklist to ensure that all work steps have been performed.

Operations	Yes	No	Comments
Building statics taken into account during installation of the system	☐	☐	
Clearances from the roof edge complied with in accordance with the specifications	☐	☐	
Rack positioned in accordance with the dimensions specifications	☐	☐	
All bolts securely tightened (Installation and telescopic rail)	☐	☐	
Adequate ballast weights used (Only for floating installation)	☐	☐	
Load weights adequately secured against slipping and tilting (Only for floating installation)	☐	☐	
Rack anchored and bolts tightened (Only for direct connection)	☐	☐	
All hydraulic connections tightened	☐	☐	
Hydraulic connections routed correctly	☐	☐	
VR 11 collector sensor connected (Only for systems WITH a collector sensor)	☐	☐	
Collectors connected to lightning protection device (Optionally for lightning protection device)	☐	☐	
Pressure testing performed (Ideally with compressed air)	☐	☐	
All connections tight	☐	☐	

	Date	Signature
All installation work has been performed correctly.	__.__.____	

5.3.2 Disposing of the packaging

The transport packaging consists largely of recyclable materials.

- ▶ Observe the applicable regulations.
- ▶ Dispose of the transport packaging properly.

6 Inspection and maintenance

6.1 Maintenance plan

The following table shows the inspection and maintenance work that must be carried out at specific intervals.

6.1.1 Calendar-based maintenance intervals

Calendar-based maintenance intervals

Interval	Maintenance work	Page
Annually	Checking collectors and connections for damage, dirt and lack of tightness	58
	Cleaning collectors	58
	Checking brackets and collector components for firm seating	58
	Check the pipe insulations for damage	58
	Replacing damaged pipe insulations	58
	Disposing of damaged pipe insulations	58

6.2 Observing inspection and maintenance intervals

Regular inspection/maintenance of the entire solar plant by a competent person is a prerequisite for ensuring that the system is constantly ready for operation, reliable and has a long service life. Vaillant recommends that you sign a maintenance contract.

Danger!

Risk of death, injury and material damage due to failure to perform maintenance and repairs work!

Failure to perform maintenance or repair work, or failure to comply with the specified maintenance intervals, may impair the operating safety of the unit and cause material damage and personal injury.

- ► Instruct the operator to observe the specified maintenance intervals strictly.
- ► Perform maintenance work on the collectors in accordance with the maintenance plan.

6.3 General inspection and maintenance instructions

Danger!

Risk of death, injury and material damage due to improper maintenance and repairs!

Improper maintenance work or repairs can impair the operating safety of the unit and result in material damage and personal injury.

- ► Only perform maintenance work and repairs on the collectors if you are a qualified competent person.

6.4 Preparing for inspection and maintenance

6.4.1 Spare parts for maintenance

Procuring spare parts

If you require spare parts for servicing or repair work, use only Vaillant genuine spare parts.

The original components of the unit were also certified as part of the CE declaration of conformity. If you do not use certified Vaillant genuine spare parts, this voids the CE conformity of the unit. We therefore strongly recommend that you fit Vaillant genuine spare parts.

Replacement parts

Applies to: Great Britain

An overview of the available genuine Vaillant spare parts can be obtained:

- From your parts wholesaler
- Alternatively contact Spares Technical Enquiries on 01773 596615 or via email: technicalspares@groupservice.co.uk

6.4.2 Preparing for maintenance

- ► Put together all the tools and materials required for the maintenance work.

6.5 Checking collectors and connections for damage, dirt and lack of tightness

1. Check the collectors for damage.
   If the collectors are damaged:
   ► Replace the collectors.
2. Check the collectors for dirt.
   If the collectors are dirty:
   ► Clean the collectors. (→ Page 58)
3. Check the connections for lack of tightness.
   If the connections are not tight:
   ► Seal the leaking connections. (→ Page 59)

6.6 Cleaning collectors

Danger!

Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 200 °C.

► Avoid working in direct sunlight.
► You should preferably perform the work in the morning.
► Wear suitable safety gloves.
► Wear suitable protective goggles.

Caution.

Material damage due to high-pressure cleaner.

High-pressure cleaners may damage the collectors due to the extremely high pressure.

► Never clean the collectors with a high-pressure cleaner.

Caution.

Material damage due to cleaning agent.

Cleaning agents may damage the surface structure of the collector and decrease its efficiency.

► Never clean the collector with cleaning agents.

► Clean the collectors with a sponge and water.

6.7 Checking brackets and collector components for firm seating

► Check the firm seating of all threaded connections.
   If threaded connections are loose:
   ► Tighten the threaded connections.

6.8 Check the pipe insulations for damage

► Check the pipe insulations for damage.
   If the pipe insulations are damaged:
   ► To avoid heat losses, replace any damaged pipe insulations. (→ Page 58)

6.9 Replacing damaged pipe insulations

1. Put the solar plant temporarily out of operation (→ Page 61).
2. Replace the damaged pipe insulations.
3. Start the solar plant up again.

6.10 Disposing of damaged pipe insulations

The pipe insulations consist largely of recyclable materials.

The pipe insulations must not be disposed of with normal household waste.

► Observe the applicable regulations.
► Dispose of the damaged pipe insulations properly.

7 Troubleshooting

7.1 Spare parts for repair

Procuring spare parts

If you require spare parts for servicing or repair work, use only Vaillant genuine spare parts.

The original components of the unit were also certified as part of the CE declaration of conformity. If you do not use certified Vaillant genuine spare parts, this voids the CE conformity of the unit. We therefore strongly recommend that you fit Vaillant genuine spare parts.

Replacement parts

Applies to: Great Britain

An overview of the available genuine Vaillant spare parts can be obtained:

– From your parts wholesaler
– Alternatively contact Spares Technical Enquiries on 01773 596615 or via email: technicalspares@groupservice.co.uk

7.2 Carrying out repairs

7.2.1 Replace leaking collectors

Danger!
Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

- ► Avoid working in direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

1. Put the solar plant temporarily out of operation (→ Page 61).
2. Replace the leaking collectors.
3. Start up the solar plant again as described in the operating system instructions.

7.2.2 Disposing of defective collectors

Your Vaillant collector consists largely of recyclable materials.

The Vaillant collector must not be disposed of with normal household waste.

- ► Observe the applicable regulations.
- ► Dispose of defective Vaillant collectors properly.

7.2.3 Sealing leaking connections

Danger!
Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

- ► Avoid working in direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

1. Put the solar plant temporarily out of operation (→ Page 61).
2. Seal the leaking connections.
3. Start up the solar plant again as described in the operating system instructions.

7.2.4 Replacing defective pipe insulations

1. Put the solar plant temporarily out of operation (→ Page 61).
2. To avoid heat losses, replace any defective pipe insulations.
3. Start up the solar plant again as described in the operating system instructions.

7.2.5 Disposing of defective pipe insulations

The pipe insulations consist largely of recyclable materials.

The pipe insulations must not be disposed of with normal household waste.

- ► Observe the applicable regulations.
- ► Dispose of the defective pipe insulations properly.

7.2.6 Replacing defective tubes

Danger!
Risk of injury caused by damaged vacuum tubes and sharp-edged components.

Shards and sharp-edged components may lead to cuts.

- ► Wear suitable safety gloves.

Danger!

Risk of burns from hot components!

The U tube, heat conducting plate and the interior of the vacuum tubes become warm as a result of solar radiation and may cause scalding.

- ► Wear suitable safety gloves.
- ► Wear suitable protective goggles.

1. Only use genuine Vaillant replacement tubes (article number 0020077347).

Note

If a tube has been damaged by a hailstorm, for example, the individual tube can be replaced.

The solar plant can remain in operation when replacing the tube.

2. Observe the relevant installation manual that is enclosed with the replacement tube.

7.2.7 Disposing of defective tubes

The Vaillant tubes consist largely of recyclable materials.

The Vaillant tubes must not be disposed of with normal household waste.

- ► Observe the applicable regulations.
- ► Dispose of defective Vaillant tubes properly.

8 Decommissioning

8.1 Temporary decommissioning

Caution.

Damage to the collectors.

Collectors that are not in operation may age more rapidly due to long periods of high idle temperatures.

- ► Only put the solar plant out of operation if you are a competent person.
- ► Do not decommission the collectors for more than four weeks.
- ► Cover any collectors that are not in use. Make sure that the cover is securely fastened.
- ► In the event of long periods of decommissioning of the solar plant, dismantle the collectors.

Caution.

Oxidation of the solar fluid.

If the solar circuit is opened when out of service for a prolonged period of time, the solar fluid may age more rapidly due to the penetrating oxygen in the air.

- ► Only decommission the solar plant if you are a competent person.
- ► Do not decommission the collectors for more than four weeks.
- ► Before decommissioning the system for a prolonged period of time, drain the entire solar plant and dispose of the solar fluid properly.
- ► In the event of long periods of decommissioning of the solar plant, dismantle the collectors.

For repair or maintenance work, you can temporarily decommission the solar plant. To do this, you must switch off the solar pump.

- ► Temporarily decommission the solar plant, as described in the operating system instructions.

8.2 Permanently decommissioning

8.2.1 Removing collectors

Danger!

Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

- ► Avoid working in direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

Danger!

Risk of burns from hot components!

The U tube, heat conducting plate and the interior of the vacuum tubes become warm as a result of solar radiation and may cause scalding.

- ► Wear suitable safety gloves.
- ► Wear suitable protective goggles.

Caution.

Damage to the collector and the solar plant.

Improper removal may cause damage to the collector and to the solar plant.

- ► Before removing the collectors, ensure that a competent person or a Vaillant customer service engineer decommissions the solar plant.

Caution.

Environmental hazard due to solar fluid.

After the solar plant is decommissioned, the collector is still filled with solar fluid which can leak out during removal.

- ► During transport from the roof, seal the pipe connections of the collector with the red plugs.

1. Undo the hydraulic connections.
2. Undo the clamping elements.
3. Remove the collectors from the roof.

Note
Do not use the carrying straps when removing the collectors as these may become brittle due to prolonged exposure to outside weather.

4. Remove the sealing plugs.
5. Drain the collector fully into a canister through two connections.
6. Fit the sealing plugs again.
7. Use adequate packing around the collectors.
8. Dispose of the collectors and the solar fluid.

8.2.2 Recycling and disposal

Your Vaillant collector consists largely of recyclable materials.

► Observe the applicable regulations.

Disposing of collectors
You must not dispose of your Vaillant collector or any of its accessories in normal domestic waste.

► Dispose of the old unit and any accessories properly.

Disposing of solar fluid
The solar fluid must not be disposed of with normal household waste.

► Dispose of the solar fluid in compliance with local regulations through an appropriate disposal company.
► Dispose of packaging that cannot be cleaned in the same way as solar fluid.

Uncontaminated packaging can be reused.

9 Customer service

Vaillant Service

Applies to: Great Britain

To ensure regular servicing, it is strongly recommended that arrangements are made for a Maintenance Agreement.

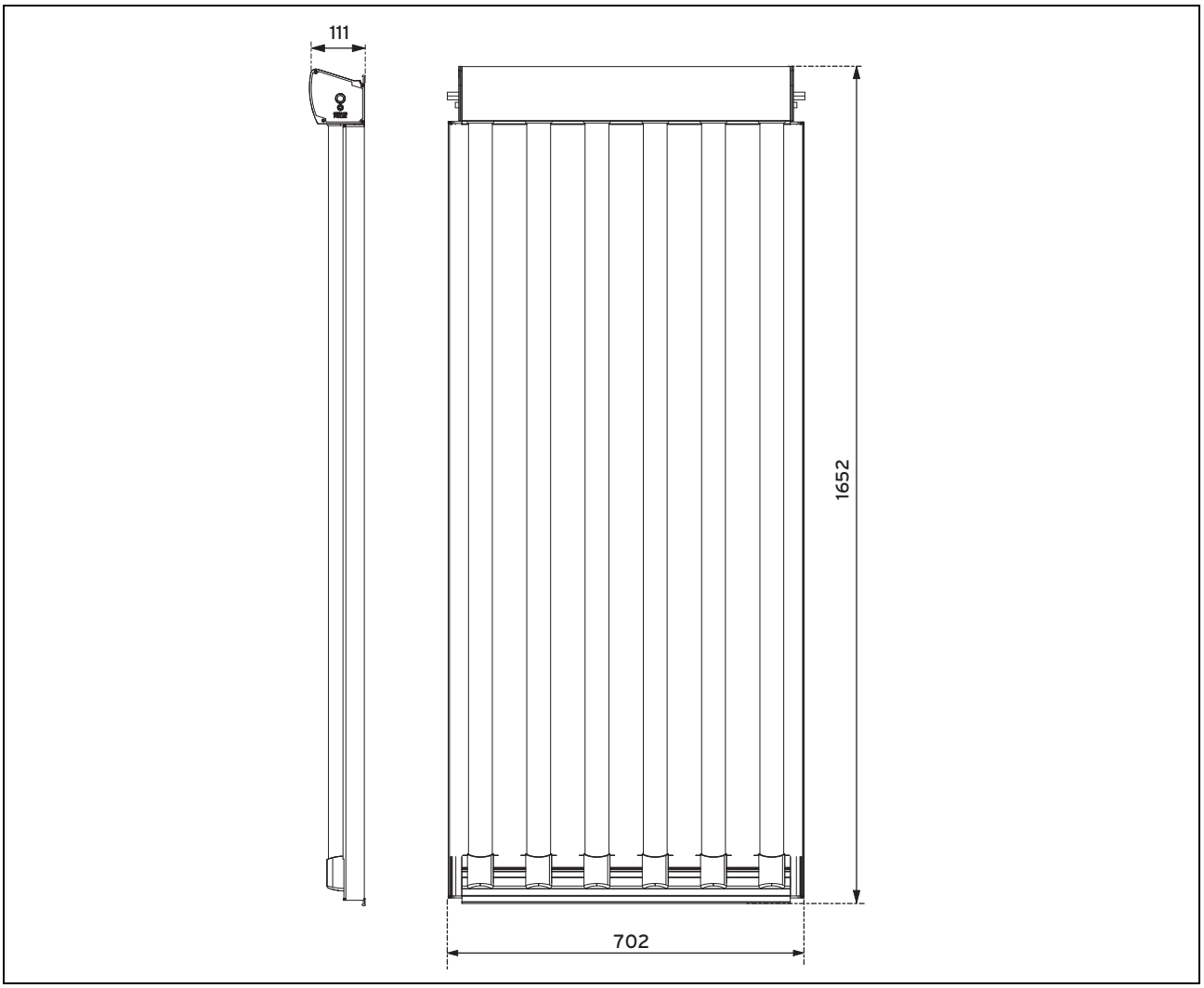
Please contact Vaillant Service Solutions for further details: +44 80 70 606 07 77

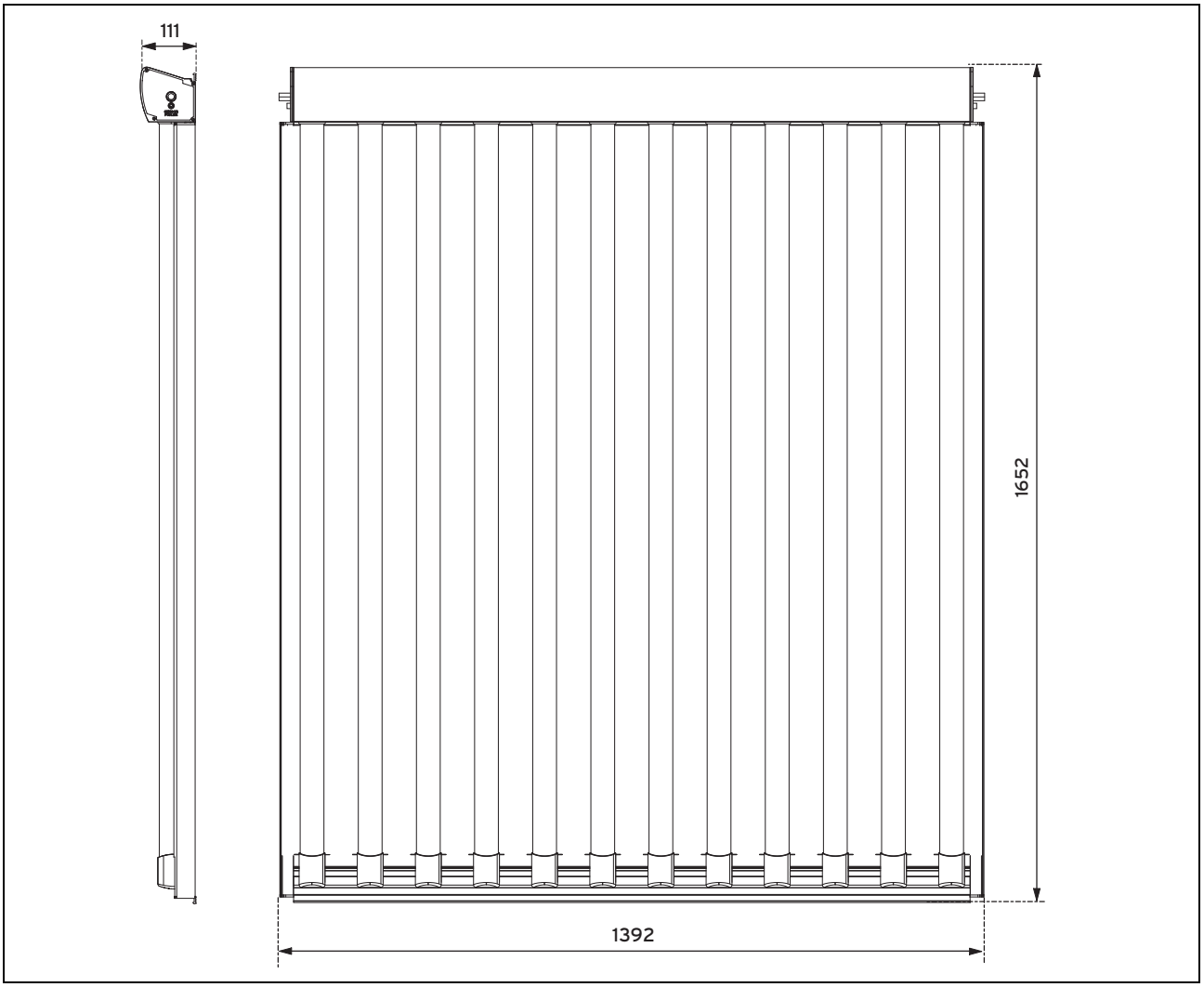
10 Technical data

10.1 Technical data table

	Unit	VTK 570/2	VTK 1140/2
Number of tubes	–	6	12
η_0 (Aperture), DIN4757-4 or EN12975	%	64.2	
c_1 with wind, or on aperture	W/(m²k)	0.885	
c_2 with wind, or on aperture	W/(m²k²)	0.001	
$K_{\theta,trans}$ (50°), or on aperture	–	1	
$K_{\theta,long}$ (50°), or on aperture	–	0.9	
Yield forecast (location: Würzburg, 5 m² aperture, 300 litre cylinder, 4 people)	kWh/m²a	586	
Peak output per collector module W_{peak}	W	642	1278
Area-related heat capacity c	kJ/(m²k)	8.3	
Volume flow (per m² of collector surface)	l/(m²h)	24	
Minimum volume flow in the solar circuit	l/h	180	
Absolute pressure in the high vacuum	bar	10^{-5} mbar (= 10^{-8} bar)	
Alpha absorber absorption	–	> 93.5% (see also ITW test report)	
Epsilon absorber emission	–	< 6% (see also ITW test report)	
Grid dimensions (length x height x depth)	m	0.7 x 1.65 x 0.11	1.39 x 1.65 x 0.11
Gross area	m²	1.16	2.30
Aperture surface area	m²	1.0	2.0
Absorber surface area	m²	1.0	2.0
Collector capacity	l	0.9	1.8
Weight	kg	19	37
System overpressure, max. permissible	bar	10	
Shutdown temperature, max.	°C	272	
Connection width, flow/return	mm	15	
Material for the tube collector	–	Al/1.4301/glass/silicone/PBT/EPDM/TE	
Material for glass tubes	–	Borosilicate 3.3	
Material for selective absorber layer	–	Aluminium nitride	
Glass tubes (outer diameter/inner diameter/wall thickness/tube length)	–	47 / 37 / 1.6 / 1500	
Colour (plastic parts)	–	Black	
Thermal shock test	ITW test number	02COL282	
Hail impact test in accordance with DIN EN 12975-2	TÜV test number	435/142448	
Type approval number	–	01-228-770	
Max. wind load	kg/Nm²	1.2	
Max. standard snow load	kg/Nm²	5	
On-roof installation angle	°	15-75	
Flat roof installation angle	°	30, 45, 60	

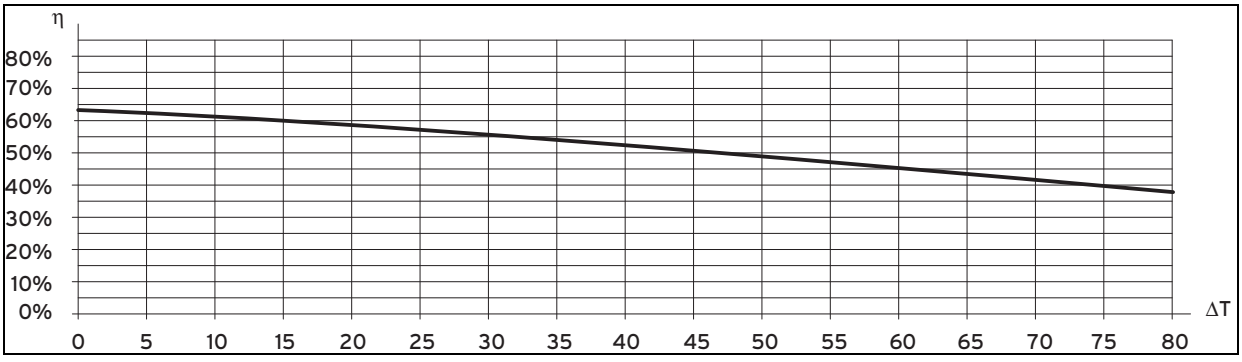
10.2 Dimensions





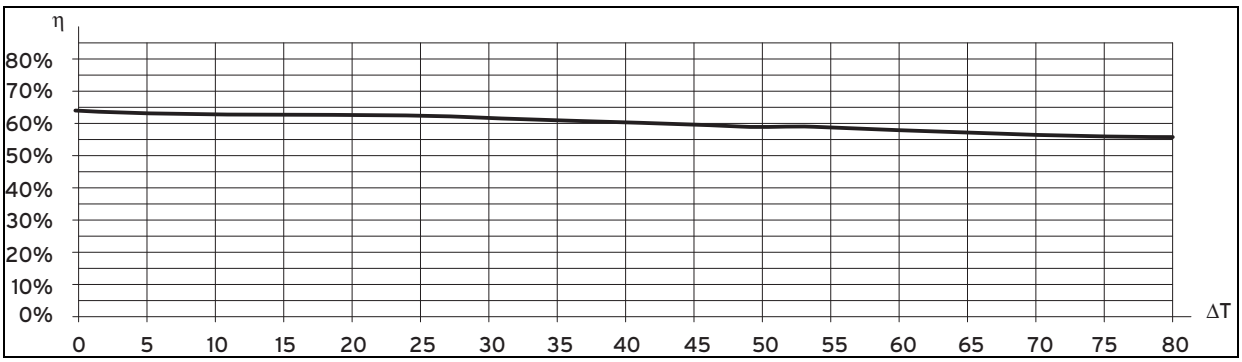
10.3 Efficiency and pressure loss

Efficiency of the VTK 570/2 and the VTK 1140/2 at a solar energy input EG of 300 W/m²



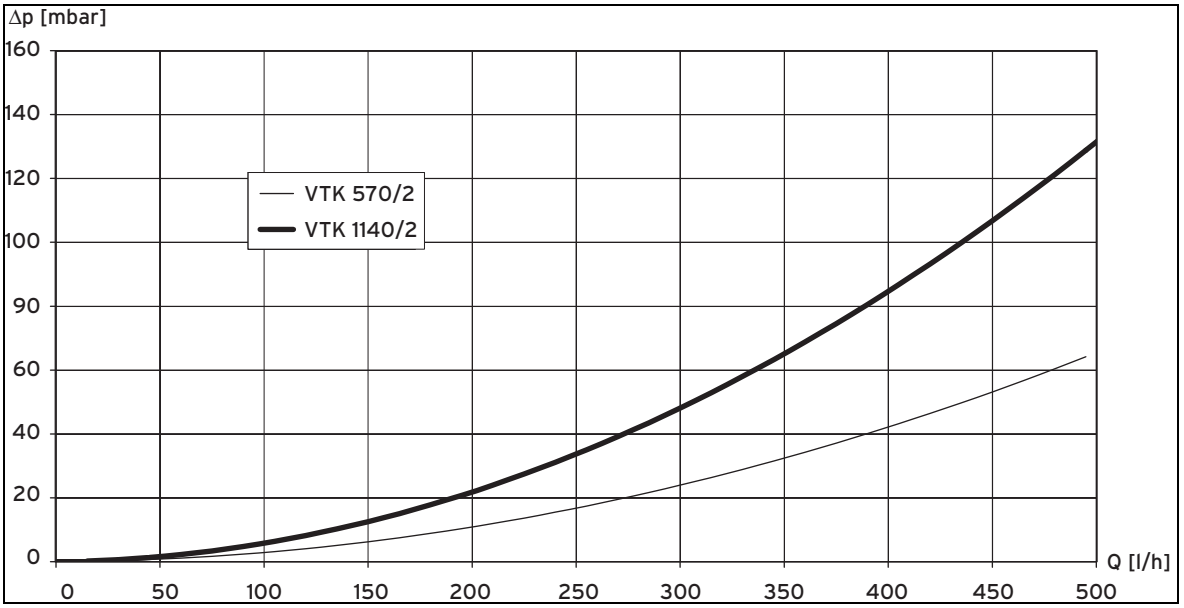
η Efficiency [%] ΔT $T_{collector} - _{ambient\ air}$ T [K]

Efficiency of the VTK 570/2 and the VTK1140/2 at a solar energy input EG of 800 W/m²



η Efficiency [%] ΔT $T_{collector} - _{ambient\ air}$ T [K]

Pressure loss



Q Mass flow [l/h] Δp Pressure loss [mbar]

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